ICE and REFRIGERATION

THE NATIONAL MAGAZINE OF INDUSTRIAL REFRIGERATION

Cracked Ice Shelling for Produce Shortens Transit Time, Improves Appearance . . . Story on Page 32

Effect of Packaging on Cooling Rate of Grapes . . . . . Page 11

AUGUST • 1952

Ice Sales in 1951 — Processed Sales Show Increase . . Page 21

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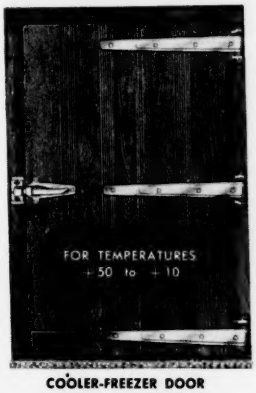

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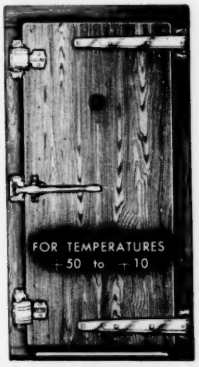

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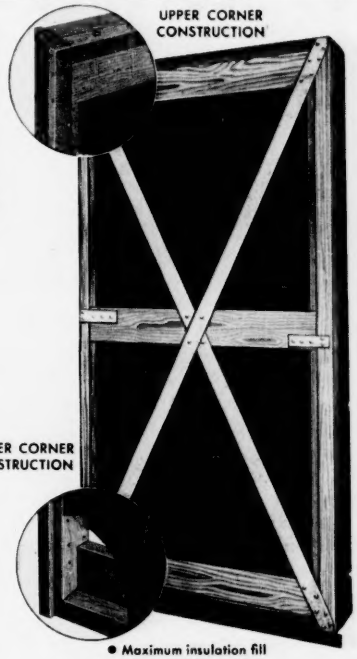

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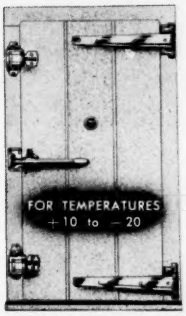

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- Extra-heavy duty gaskets
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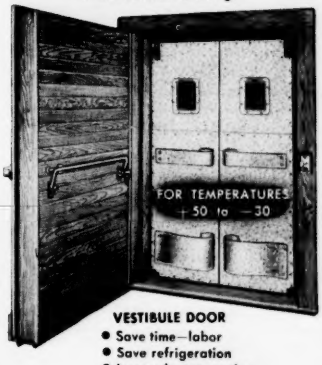

VESTIBULE DOOR
- Save time—labor
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TRACK DOOR
- For abattoirs
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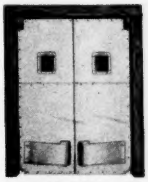

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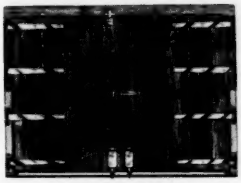

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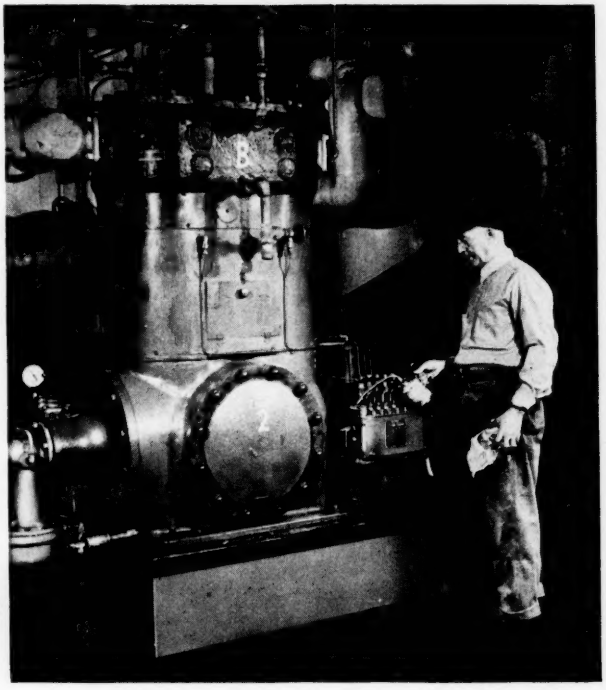
Facing this serious condition, the plant called in a Sun representative for technical assistance. He recommended a Suniso Refrigeration Oil. His recommendation was followed, and the result has been absolutely trouble-free operation of all the compressors. Four years have passed, and they are functioning perfectly at temperatures ranging from 160 F to −30 F. Sludge and carbon deposits have been eliminated. The line filters turn with a twist of the wrist at all times. The oil is now changed only once every six months. Oil consumption has been reduced 66 percent, overall maintenance reduced 33 percent.



NO MORE SLUDGE AND CARBON. Four years ago a refrigeration oil hindered efficient operation of the nine compressors used in the Louis Sherry ice cream plant. The heavy deposits the oil formed necessitated special handles for operation of the line filters, plus frequent draining for external oil filtering. Changing to Suniso ended the trouble.

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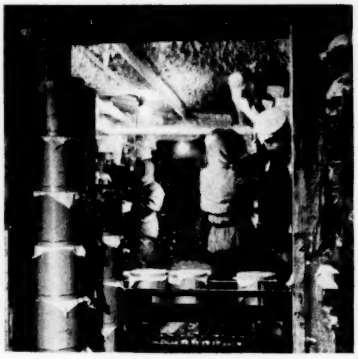

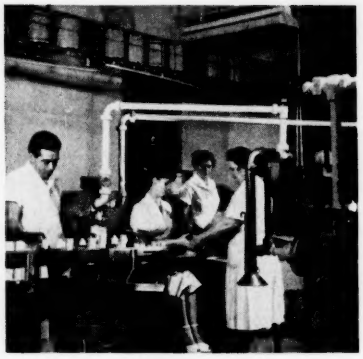

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SUNISO DOES NOT "WAX OUT." In the hardening rooms, where $175,000 worth of ice cream is stored before shipment, temperatures are held between −25 F and −30 F. This is no challenge to Suniso, which remains waxfree at temperatures far lower.

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August, 1952

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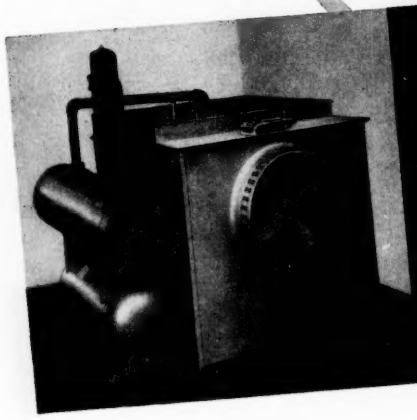
New

SAVES WATER and CUTS MAINTENANCE COSTS . . .

Illustrations show two views of a 35 ton Condenser Tower prior to partial disassembly for shipment.



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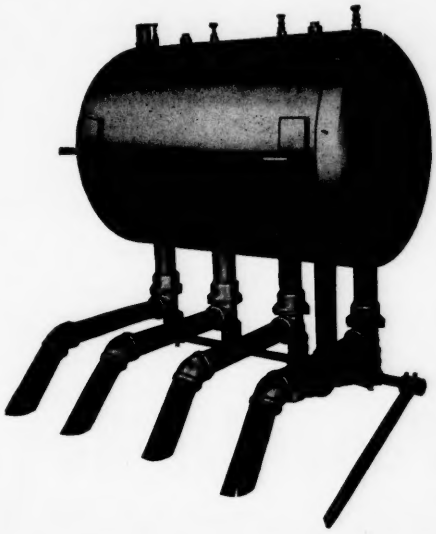

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"Formerly, we had ice delivered in bushel baskets, but it was too often dirty when we received it," reports Mr. Quinn. "Now we insist on Union Paper Ice Bags. Our ice is clean and the bags retard melting so satisfactorily that ice delivered on Saturday will carry over for Sunday."

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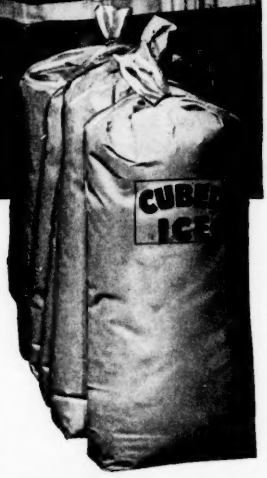
Yes, the companies using Union Paper Ice Bags get the cream of the business according to reports clear across the country. If you haven't already asked for samples of the one-trip Union Paper Ice Bag, don't delay. Write for free samples now.



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In the Spotlight

BUILDING PROFITS through iced displays of produce is the subject of a bulletin issued by the United States Department of Commerce, with information which the ice man will find of much value in passing on to his produce customers. See story on page 9.

A STUDY has been made on the effect of packaging materials and package types on the cooling rate of table grapes. A discussion of the methods used, and a summary of the results obtained, are given in the article which starts on page 11.

A MECHANICALLY - Refrigerated railway car for fresh meats has been put in service by John Morrell Co., meat packers of Ottumwa, Iowa. For illustrated description see page 19.

ICE SALES for 1951 amounted to 33,789,502 tons, a decrease of only .32 of 1 percent from 1950. Sales of processed ice, showed an increase of 7.75 percent. These figures are given and analyzed in report on the annual survey made by the National Association of Ice Industries, starting on page 21.

PRICE CONTROLS on ice were removed, effective June 27, by the Office of Price Stabilization. For details see page 23.

FOR PRODUCE counters in retail food stores a refrigerated divider has been devised to be filled with crushed ice. It cools and humidifies the fresh fruits and vegetables. For description and picture see page 25.

ICE VENDORS sell ice, the customers like them, and they cut delivery costs. That is the considered opinion of an ice distributor who has thirteen vending machines in operation. For details see article on page 27.

COVER: New type combination divider and icer, enhances the display of vegetables through the contrast of cool, crushed ice and the bright colors of carrots, tomatoes, celery, etc. A "wall" of crushed ice permits the cool, moist air to circulate sideways and downward to prevent dehydration, spoilage and shrinkage and keeps vegetables fresh and color-bright. Story on page 25.

TRAINED WORKERS are an essential factor in reducing accidents in refrigerating plants, according to a safety engineer, whose article is based on a study of refrigerating system accidents. See page 29.

A NEW FREEZER storage building has been completed by the Arizona Ice & Cold Storage Company at Tuscon, Arizona, with capacity of 30 to 35 carloads of frozen foods. For description and pictures see page 35.

FREEZER SPACE available in refrigerated warehouses in that section will be compiled and made available to storage customers by the Southeastern Chapter N.A.R.W. For details see page 37.

SHIPMENTS of air conditioning and commercial refrigerating equipment during 1951 showed an increase over 1950. For details see page 52.

AN UNDERGROUND refrigerated warehouse is in operation in a limestone cave seventeen miles west of Kansas City. For description and pictures see page 38.

DRY ICE as the refrigerating medium in transportation of frozen foods was tested in a refrigerator car with frozen peas by the U. S. Dept. of Agriculture. Results are given in the article on page 44.

60 Years Ago

From the August, 1892 issue of ICE AND REFRIGERATION

NATURAL ICE was a commodity of big commercial value 60 years ago at a time when manufactured ice was in its infancy. One of the pioneers was Henry Tibbets Ropes. About 1847 he founded a company, Ropes, Weston & Co., for exportation of ice from America to England. But they met with constant loss and discouragement and all but Mr. Ropes withdrew. In 1890, his son, Frank Henry Ropes wrote: "My father kept to his business with great tenacity of purpose, and by unremitting attention to the minutest details the ice trade so increased and prospered in his hands, that whereas, in 1848, the output of ice was only a few hundred tons per annum, last year, 1889, we put out 5,572 tons. The trade has principally been confined to England, Scotland, Ireland and the Isle of Man; but once we sent some ice as far as Gibraltar. Owing to the short crop of ice in New York last winter, cargoes of ice have been exported thither this summer from Norway; and for the first time, I believe, in the history of the ice trade, we have been able to compete with New York in the price. I might add, that for many years past all the ice used in this country has been imported from Norway, with the exception of some artificial ice that has been manufactured here."

A PIPE LINE extension of about a half mile of additional street mains was announced by the St. Louis Automatic Refrigerating Co., for furnishing refrigeration to the downtown storage depots of breweries. With street line service they can get lower temperatures in their distributing storage boxes than is possible with ice and can send out the beer from these boxes at the same temperature as from the brewery.

FOR PRODUCING extremely low temperatures, a device was constructed by Mr. Ducretet of Paris from the indications of its originator, Mr. Cailletet. The principal of its action was the expansion and evaporation of liquid carbonic acid. It was intended to produce and maintain temperature as low as minus 112 F. Though limited in size, the article comments "it is as effective as we have had occasion to ascertain, as it is ingenious and cheap."

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Size range: Globe and Angle, 1/4" thru 1"; Tees, 3/8" thru 1"
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Flanged Shut-Off Valve
Size range: Globe, 1 1/4" thru 4"
Three Way Dual Shut-Off Valve
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Building Produce Profits Through Iced Displays

FROM the United States Department of Commerce comes some practical suggestions on the use of ice by produce dealers, — information which the ice man will find good business to pass on to his produce customers. The following suggestions are from the Business Information Service, Small Business Aids, Bulletin 508.

The produce retailer who properly displays fresh fruits and vegetables on crushed ice for either self-service or over-the-counter sales generally gains in several ways. They are:

1—Loss of moisture and consequently of weight of the produce is held to a minimum.

2—Losses due to decay are held to a minimum.

3—Crisp, fresh appearance, and nutritive value of produce are retained.

4—Turnover and "impulse sales" are increased.

Reduction in weight loss. Water is one of the most important component factors of produce. Under normal field growing conditions, fruits and vegetables are approximately 90 percent water by weight. Loss of water by the produce results in a decrease in its weight and a wilted, "aged" appearance.

To prevent dehydration and consequent weight loss of produce, refrigeration and high humidity are necessary. Ice can fill this dual need for cooling and humidifying.

Not long ago, the Ohio State University Research Foundation compared the shrinkage of 14 vegetables when displayed at room temperature and when held in crushed ice. When displayed at room temperature for two days, the vegetables suffered weight losses averaging about 20 percent. When held on ice for two days, most vegetables actually gained a little weight. The results of the test are shown in the table.

It is Iced vegetables like these that will help food stores sell more produce. This counter was shown at a convention of the Virginia Growers Association.

SHRINKAGE OF VEGETABLES AT ROOM TEMPERATURE AND ON ICE

Vegetable	Percent of original weight	
	After 2 days in air	After 2 days on ice
Asparagus	80	104
Beets	89	102
Broccoli	58	105
Cabbage	93	102
Carrots	83	102
Celery	71	102
Green peppers	95	100
Kale	70	108
Lima beans (in pod)	94	100
Peas (in pod)	86	100
Radishes	80	103
Spinach	69	122
Swiss Chard	65	115
Tomatoes	99	100

Results of Test

Retention of vitamin content. According to scientific tests conducted in a number of universities and colleges, fresh fruits and vegetables remain fresher and retain their vitamin content far longer when displayed on ice than when displayed unprotected from circulating dry air. The ice keeps the produce garden fresh by providing both a low temperature and a high humidity, especially when kept in contact with the produce.

Increase in turnover and impulse buying. A major portion of the housewife's purchases of produce are impulse sales. For that reason, the appearance of the grocer's produce display is all-important. Crushed ice keeps produce firm and crisp, gives a sparkling appearance to the display, and suggests freshness and quality to the housewife.

Needed equipment is simple. The grocer who wishes to use the iced display method can purchase display racks built especially for the method or can have his present rack adapted for iced displays. Specially built racks or plans for remodeling his present racks can be obtained by the grocer from his local ice distributor.

The display case used for the iced method can be either inclined or horizontal. The slope of the case should not be too steep, however, or the flow of air over the produce will be increased and cooling efficiency reduced. Further, the circulating air will dry and wilt the surfaces of the top layers of produce, giving them a "left-over" appearance. Consequently, shoppers will push aside the top produce and take underneath items which look fresher because they are moist and have darker, richer color. Placing a glass barrier at the front of the case will force the circulating air to travel a safe distance above the produce. The produce then will retain a thin, protecting film of moisture.

Insulation

The case must be well insulated on all sides and below. A permanent drain for ice meltage must be provided. The deck of the case should be at least 10 to 11 inches deep, although in some cases a deck 6 or 7 inches deep has proved adequate. For stores with rapid turnover, a shallow, inclined deck usually is preferable. However, a store which has a slower turnover and consequently must hold produce for several days might consider using a case with a deeper deck.

Preparing the display. In preparing an iced produce display, the first step is to spread a bed of ice about three inches deep in the case. The produce then is placed on top the bed of ice and sold in the same manner as from any other type of display.

Various Methods of Displaying Produce

In displaying the produce, the grocer may use the ribbon method, the counter replacement method, or a combination of the two methods. In deciding which method to use, he should consider such factors as the size of his display rack, the volume of his produce sales, and conveniece of his customers and the produce clerks.

(a) The ribbon method. When the ribbon method is used, the produce is arranged on the ice in sections running from the front to the back of the display case. By means of partitions, the grocer can prevent small items, such as fresh lima beans, from spilling over among other produce items.

(b) The container replacement method. In this method, the produce is displayed in small wire baskets built to fit the case. There is no need for partitions between items, as each item is placed in its own basket. Replenishment of the display is easy, since empty baskets are merely replaced with full ones prepared in the back of the store. This method is well adapted to checkerboard style displays, in which a great variety of produce can be displayed in orderly fashion in limited display space.

(c) A combination of methods. The grocer may find that a combination of the ribbon and container replacement methods would be best for his needs. He could arrange larger items, such as lettuce and cauliflower, in ribbon displays and could place small items, such as peas and beans, in individual containers.

Suggestions on preparing and arranging produce. If best sales results are to be achieved, produce must be in good condition when placed on display. This means that items must be carefully sorted, cleaned, and trimmed in the back room before being placed on sale. Poorly sorted, dirty, improperly trimmed items lead customers to search around in the display for items worthy of purchase. Green vegetables, such as spinach, cabbage, and celery, may be partially dehydrated when received by the grocer, and therefore should be washed in cold water. In addition to cleaning them, this will restore their crispness and attractiveness and reduce ice meltage.

Arrangement of Items

Here are some pointers on arrangement of produce items, using a combination of the ribbon and container replacement methods.

Asparagus, broccoli, cauliflower, and similar items perferably should be placed with stalk ends embedded in the ice, as this seals off the stems and slows down the life processes. Lettuce and cabbage may be placed on the ice with stalks up or down. Some grocers prefer to place the lettuce with stalk ends up, since customers then pick up the heads at the solid or stump ends, resulting in fewer broken or separated leaves.

Celery, carrots and corn should be laid on the ice and sprinkled with crushed ice. If radishes have a slow turnover, they should be placed on the ice with the bright green tops showing to indicate freshness. Thus, they are better protected.

Peas, beans, and Brussels sprouts may be displayed in direct contact with the ice or, for the sake of handling, may be placed in baskets or boxes which then can be embedded in the ice.

Tomatoes and peppers should be laid carefully on the ice and should be so arranged that they will lend color and contrast to the display.

Replenishing the display. In keeping with good merchandising practices, the produce display should be replenished at frequent intervals during the day. As a result, the display always will look fresh and inviting and the ice will have less chance to melt, since it will be covered constantly with produce.

Overnight holding of produce. Grocers who use the iced method of displaying produce find that it eliminates the need for sprinkling water on vegetables during the day and for removing fruits and vegetables from the racks for overnight storage.

For overnight protection, all that needs to be done is to spread a thin coating of crushed ice over the produce, then place a waterproof cover of canvas or other suitable material over the entire display, making it as airtight as possible.

Battery Storage Offers New Business

THE possibilities of refrigerated storage of lead-acid (automobile) storage batteries has interested a number of refrigerated warehousemen. At first glance such batteries do not seem to be a commodity that would be benefitted by such storage, but there are advantages, as explained in recent comment in the Information Bulletin, issued by the director of The Refrigeration Research Foundation.

When such batteries are stored at ordinary atmospheric temperatures, they self-discharge at rates dependent on the ambient temperature, and so must be recharged, usually at intervals of three to four weeks. This costs money, takes time, is inconvenient and it not necessarily the best way to handle the battery, depending on when and how it is done.

Batteries are sold mostly in the late fall months. It would be advantageous, for a number of reasons, to manufacture them more or less all year round, with the peak production possibly in March to June. Battery fabrication requires skilled personnel; it would help to retain this skilled labor in employment if the product could be held in a relatively stable and first-class condition, after manufacture and until sold.

This idea, from the standpoint of the refrigerated warehousing industry, was first brought out by L. M. Ashenbrenner of Toledo, Ohio and others. The Refrigeration Research Foundation then conferred, with several warehousemen, who had some experimental experience with storing batteries. Then, as their acquaintance and knowledge in this field expanded, they consulted with technical and sales representatives of battery manufacturers and battery marketers and the commissioner of the American Association of Battery Manufacturers in Akron, Ohio.

Research and technical people in the various battery-making and battery-selling organizations seem to be agreed that refrigerated storage at 28-32 F for three to five months, and 0 F for very long storage, is the real answer to the problem. That's stating the case in the briefest and simplest way.

This business has considerable storage potential considering that from 5 to 10 million batteries, weighing on an average between 40 to 45 pounds, could well be stored for three to six months annually, under a planned industry cold storage program. And storage would likely be all over the U.S.A. and not merely at points of production.

Here is a new commodity storage service that is worth looking into and "selling" to potential customers. The Refrigeration Research Foundation is helping actively to develop the essential technical and factual background. The rest is up to warehousemen and the battery manufacturers and marketers.

A Study of Packaging Materials

The effects of packaging materials and package types on cooling rate of table grapes. Study conducted by Bureau of Plant Industry, U. S. Dept. of Agriculture, Fresno, Calif.

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CALIFORNIA table grapes for domestic shipment are generally packed in lidded lug boxes. These boxes vary slightly in construction but usually the outside dimensions are similar and the net weight of fruit (28 pounds) is uniform. However, it is the practice of most packers to use certain adjuncts such as pads and liners or curtains in the grape lug and these are of numerous types and materials. The basic pad material may be excelsior, shredded paper or corrugated fiberboard, and the liners may cover the sides, the sides and ends, or, as a unitized interliner, the entire inner surface of the box.

Curtains are made of bond paper or plastic film and may or may not have openings for ventilation. The variety of packaging materials has given rise to numerous questions concerning the effects of specific items upon cooling of the packed grapes. The data presented in this paper were obtained in an effort to determine the effect of several packaging materials and package types on the rate of cooling under comparable controlled conditions.

Materials and Methods

For this study uniform air velocity was considered essential. Uniform air movement which did not vary during a test period or between tests was obtained in an air tunnel constructed of plywood and placed in one of the refrigerated rooms at the field laboratory. Fig. 1 shows a top view of the tunnel with the top cover removed. A 24-inch propeller fan moved air through a stack of grape lugs placed lengthwise to the direction of air movement with a space of 1½ inches between rows. Air was moved lengthwise of the lugs in order to simulate the usual arrangement in precooling rooms. It had been shown previously that air moving along the sides of packed grape lugs cools the fruit faster than air moving along the solid ends. Air velocity between rows was measured by means of a velometer.

Four layers of lidded grape lugs were placed in the tunnel in the position shown, with each layer containing six lugs. All the lugs were empty except the three under test. The test lugs were packed with exactly 28 pounds of grapes by the usual commercial method and were placed in the third layer from the bottom of the air tunnel. The three packed lugs for a given test were similar in all respects and served as replications.

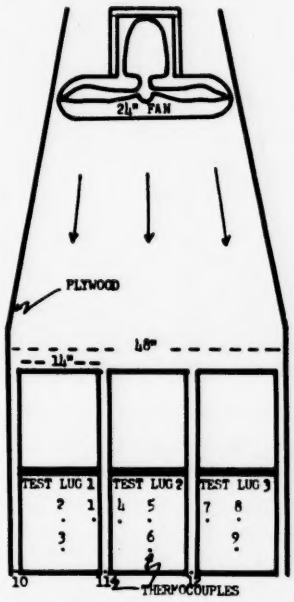

Fig. 1. Diagrammatic top view of tunnel used in grape precooling tests. Test lugs in third layer of four-layer stack.

The tests involving different pads, liners, and curtains were made in standard boxes constructed of materials cut to exact specifications for display lug No. 787 of the National Wooden Box Institute and assembled with the side piece 5/16 inch above the bottom piece. The fact that the boxes surrounding the packed test boxes were empty undoubtedly resulted in somewhat accelerated cooling but the tests were comparative only between different types of packaging material and packages and the use of empty boxes for stack fillers did not affect these comparisons.

Thompson Seedless grapes were used in the first three tests and thereafter all test lugs were packed with grapes of the Ribier (Alphonse Lavallee) variety. The latter variety proved more suitable because of the larger berries and tighter capstem attachment.

Temperatures Taken

All temperatures during precooling were taken with iron-constantan thermocouples and a direct reading potentiometer. The thermocouples used for obtaining fruit temperatures were placed in individual grapes at approximately the middle of the box from top to bottom and in the positions shown in Fig. 1 with respect to the ends and sides of the boxes. Air temperatures and air velocities were taken between rows at the points shown.

The four types of pads compared in these tests are shown in Fig. 2. All of these are used commercially in California.

Two types of bond paper curtains, one with holes for ventilation along the edge, are shown in Fig. 3. Both of these are held in place by cardboard attachments placed between the side piece of the lug and the fruit. When curtains are used the ordinary side liners are omitted.

Fig. 4 illustrates the two types of liners used for test purposes. The two-piece side liners are generally used in conjunction with a bottom pad but when the unitized liner is used the bottom of the liner substitutes for a pad.

Types of Boxes

The three types of boxes commonly used for table grapes are shown in Fig. 5. Those identified as 2 and 3 are made of identical material but have different attachment of the side pieces which are one inch narrower than the end pieces. Lug 1 has sides of the same width as the ends and therefore must be assembled as

The writer gratefully acknowledges the assistance of W. R. Barger and D. H. Dewey of the Fresno Field Laboratory in photographing the packaging material and in preparation of the test equipment. Packages and packaging materials were supplied by General Box Distributors, Blake Moffitt and Towne, and Caskey Paper Company.

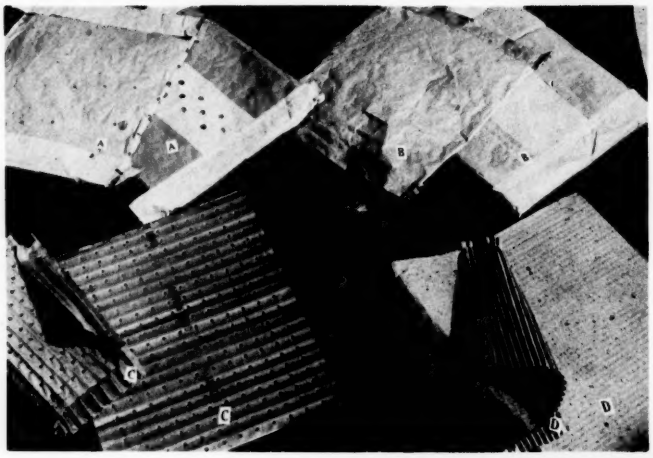

Fig. 2. Pads used in precooling tests: A, Vented excelsior; B, regular excelsior; C, vented corrugated; D, regular corrugated.

shown. A further difference is that lugs 2 and 3 are cleated on the bottom whereas 1 has no bottom cleat. Lids used on all of these lugs were unitized with three veneer slats and a half-inch cleat at each end.

The packed test lugs were placed in a warm chamber with forced air circulation for several hours prior to the start of a precooling test in order to equalize fruit temperatures. However, it was not possible to provide exactly the same average fruit temperature at the start of each test run.

The precooling tests were conducted for 8 hours with temperature readings made every 30 minutes during the first 2 hours and hourly thereafter. In presenting the data, temperatures taken in individual berries at three positions in each of three replicated lugs were used to arrive at an average fruit temperature for a given reading. The three air temperatures were averaged to obtain the air temperature shown. Air temperatures fluctuated slightly but generally not more than 4 or 5 degrees during the 8 hour test period.

Results

Tables 1 and 2 summarize the results obtained in terms of average fruit and air temperatures for each of the types of packages and packaging material used. Two indices of the rate of cooling of the grapes are shown; they are the average degrees

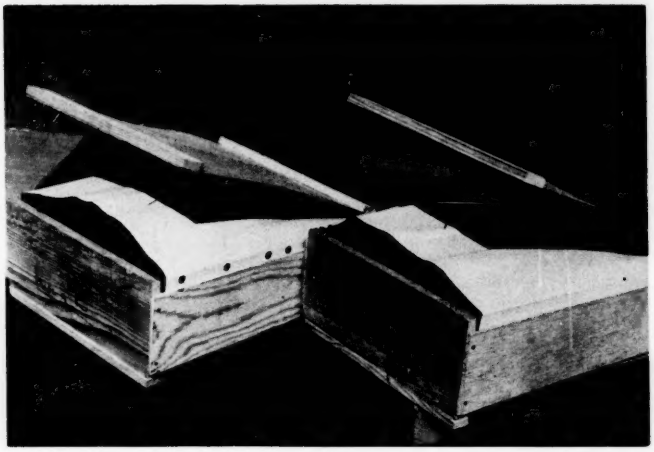

Fig. 3. Curtains used in precooling tests; Left, Vented white bond; Right, regular white bond.

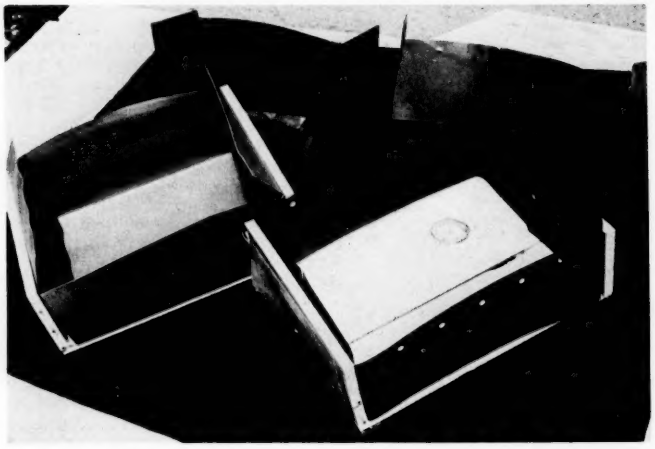

Fig. 4. Liners used in precooling tests: Left, Unitized chipboard interliner (Skinner); right, 2-piece chipboard side liners.

cooled per hour and the cooling coefficient. It was pointed out by Pentzer et al (4) that the cooling coefficient is a somewhat more dependable index than the degrees cooled per hour because the latter is materially affected by the temperature of the product at the start of cooling, the period of cooling, and the differential between air and product temperatures.

These factors are all considered in the cooling coefficient. The difference between average air temperature and average fruit temperature for each reading is determined, and the average of these differences is then divided into the average degrees per hour of product cooling to give the cooling coefficient. Rapid cooling

TABLE 1—EFFECT OF LUG PADS ON COOLING RATE OF GRAPES IN WOODEN LUGS, DURING EIGHT HOURS OF PRECOOLING FRESNO, CALIFORNIA, SEPTEMBER, 1951

Test No.	Grape Variety	Box	Pad	Liner	Curtain	Aver. Air Vel.	Aver. Air Temp.	Aver. Fruit Temp. Start	Aver. Fruit Temp. Finish	Aver. Temp. Drop Per Hour	Cooling Coefficient[2]
						L.F.M.	F.	F.	F.	F.	
1	Thompson Seedless	Display lug side 5/16 in. above bottom	Excelsior ventilated	2-piece curved chipboard	None	240	32.7	78.7	52.5	3.27	.10
2	Ditto	Ditto	Excelsior non-vented	Ditto	None	240	32.4	72.6	48.4	3.02	.11
3	Ditto	Ditto	Corrugated 11/16 in. thick, ventilated	Ditto	None	240	33.6	76.5	51.5	3.12	.11
4	Ribier	Ditto	Corrugated 5/8 in. thick, non-vented	Ditto	None	550	38.7	75.4	42.3	4.14	.24
5	Ditto	Ditto	Excelsior non-vented	Ditto	None	550	39.7	73.4	42.4	3.88	.25
6	Ditto	Ditto	Corrugated 11/16 in. thick, ventilated	Ditto	None	550	39.3	73.9	43.7	3.78	.22
7	Ditto	Ditto	Excelsior ventilated	Ditto	None	550	38.5	74.1	42.9	3.90	.23

[1] Display Lug #787 of National Wooden Box Institute, 5¾-inch ends, 4¾-inch sides; #157 unitized, 2-slat bottom with ½-inch cleat; #12 unitized, 3-slat top with ½-inch cleat.
[2] The "cooling coefficient" is the rate of temperature drop in degrees F per hour divided by the difference between the average grape and the average air temperature.

is indicated by a high coefficient and a low coefficient figure indicates slow cooling.

As shown in Table 1, the three different pads tested at air velocities of 240 l.f.m. (linear feet per minute) and average air temperatures of 32.4 to 33.6 F gave practically identical cooling coefficients. The four types of pads tested at 550 l.f.m. with somewhat higher average air temperatures varied in cooling coefficient only between .22 and .25, a difference of doubtful significance, indicating that the type of pad used in a grape lug had little effect upon the cooling rate of the fruit.

As shown in Table 2, some packaging materials had a marked effect on rate of cooling as measured by cooling coefficient. The addition of curtains materially slowed cooling whether the curtains were ventilated or solid. Curtains used in conjunction with the excelsior pad (test 8) gave a cooling coefficient of .11, whereas the same pad in a pack without

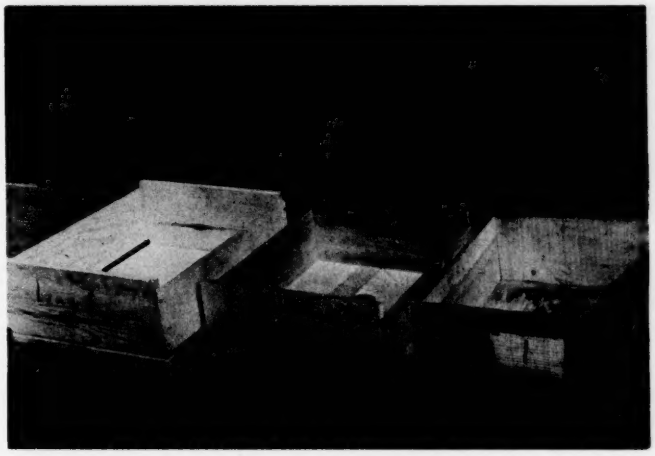

Fig. 5. Lugs used in precooling tests: 1, "Lodi" with side flush with top and bottom; 2, display with side flush with bottom; 3, display with side 5/16 inch from bottom.

TABLE 2—EFFECT OF CURTAINS AND TYPE OF PACKAGE ON COOLING RATE OF GRAPES DURING EIGHT HOURS OF PRECOOLING FRESNO, CALIFORNIA, SEPTEMBER, 1951

Test No.	Grape Variety	Box	Pad	Liner	Curtain	Aver. Air Vel.	Aver. Air Temp.	Aver. Fruit Temp. Start	Aver. Fruit Temp. Finish	Aver. Temp. Drop Per Hour	Cooling Coefficient[1]
						L.F.M.	F.	F.	F.	F.	
8	Ribier	Display lug, side 5/16 in. above bottom	Excelsior ventilated	None	White bond paper non-vented	550	38.7	76.2	54.2	2.75	.11
9	Ditto	Ditto	Ditto	None	White bond paper ventilated	550	39.2	77.8	52.4	3.18	.13
10	Ditto	Ditto	Ditto	None	None	550	40.8	78.7	42.3	4.55	.31
11	Ditto	Ditto	None	Skinner unitized chipboard interliner	None	550	40.3	77.6	52.0	3.20	.13
12	Ditto	"Lodi" lug sides same width as end, no bottom cleat	Excelsior ventilated	2-piece curved chipboard	None	550	39.3	77.8	49.7	3.51	.5
13	Ditto	Display lug, side flush with bottom	Ditto	Ditto	None	550	39.1	75.5	47.4	3.51	.17

[1] The "cooling coefficient" is the rate of temperature drop in degrees F per hour divided by the difference between the average grape and the average air temperatures.

curtains or liners (test 10) gave a cooling coefficient of .31. Side liners and the excelsior ventilated pad were used in test 7 (Table 1) and the cooling coefficient was .23, indicating that the addition of liners reduced the cooling rate somewhat as compared with the pad alone. The combination of curtains and pads reduced the cooling rate to a greater extent than did liners and pads when used together.

The unitized liner gave a cooling coefficient of .13 as compared with .23 for the two-piece side liners with an excelsior ventilated pad. Tests 7, 12 and 13 (Tables 1 and 2) indicate that raising the side piece 5/16 inch above the bottom of the lug, forming a crack, resulted in more rapid cooling than was obtained when the side pieces were flush with the bottom of the lug.

Cooling Rates

Semi-logarithmic graphs portraying certain cooling rates are shown in Figs. 6, 7, and 8. These charts were drawn according to the method of Gerhardt and Hukill (2) and Sainsbury (6). As did the cooling coefficient figure used in Tables 1 and 2, these graphs minimize inconsistencies caused by differences in commodity temperature at the start of precooling and fluctuating air temperatures during cooling. The steepness of the line indicates the rate of cooling. Comparisons between tests made by this method are more readily interpreted than curves of average commodity temperatures plotted against time on rectangular coordinate paper.

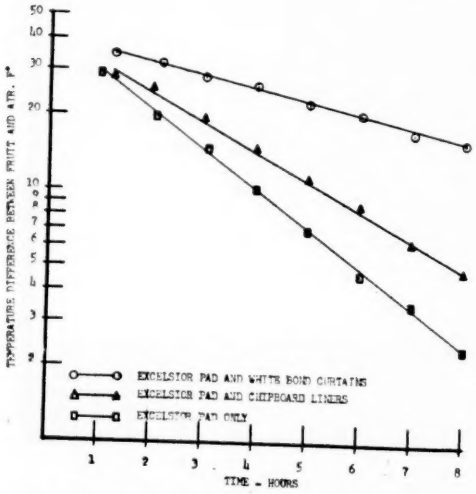
TEMPERATURE DIFFERENCE BETWEEN FRUIT AND AIR, F°
TIME - HOURS
EXCELSIOR PAD AND WHITE BOND CURTAINS
EXCELSIOR PAD AND CHIPBOARD LINERS
EXCELSIOR PAD ONLY

Fig. 6. Effect of packaging material on rate of cooling of grapes in standard display lugs at air temperatures of 38.5 to 40.5 F. and air velocity of 550 l.f.m.

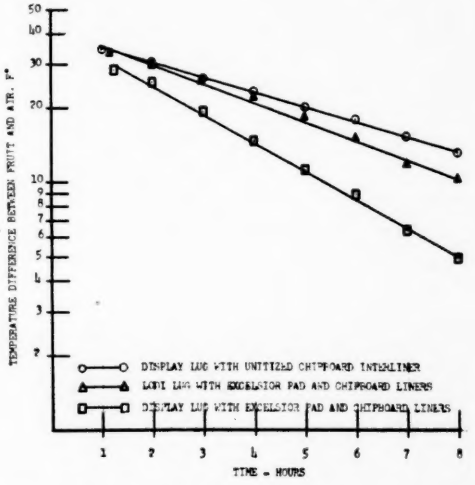
TEMPERATURE DIFFERENCE BETWEEN FRUIT AND AIR, F°
TIME - HOURS
DISPLAY LUG WITH UNITIZED CHIPBOARD INTERLINER
LUG WITH EXCELSIOR PAD AND CHIPBOARD LINERS
DISPLAY LUG WITH EXCELSIOR PAD AND CHIPBOARD LINERS

Fig. 7. Effect of box type on rate of cooling of grapes at air temperatures of 38.5 to 40.5 F. and air velocity of 550 l.f.m.

Fig. 6 illustrates how each addition of packaging materials slows the cooling rate. The steepest line and therefore the fastest cooling rate occurred when pads only were used in the lugs. The addition of side liners to the pad gave an intermediate cooling rate, and when a curtain was used with the pad the cooling rate was decreased even more.

The effect of box type upon cooling is shown in Fig. 7. As shown earlier by the cooling coefficients, the highest cooling rate was obtained with the side pieces of the lug set 5/16 inch above the bottom and the slowest cooling was with the full sided lug.

Fig. 8 illustrates the effect of air

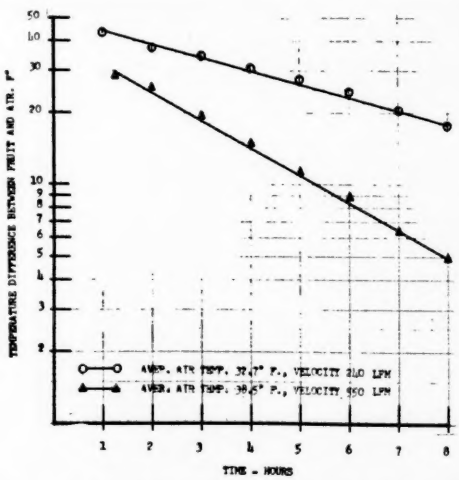

Fig. 8. Effect of air temperature and air velocity on rate of cooling of grapes in display lugs with excelsior pads and chipboard liners.

temperatures and air velocity upon cooling. It is interesting that the higher air velocity produced materially faster cooling than the lower rate of air movement even though the air was approximately 6 degrees warmer than that used at the lower velocity.

Discussion

Previous work on the precooling of grapes (3) showed that Cellophane curtains reduced their cooling rates in display lugs under forced air circulation. The tests reported herein show that the addition of either curtains or liners materially reduced cooling of grapes packed in lugs with pads. However, the type of pad used in the lug was not a factor in the rate of cooling.

The reduced cooling rates of fruit packed with liners and curtains is probably caused by obstruction of the air blast by these materials, with the result that less air moves through the lug of fruit. This protection of the fruit from the air blast is thought by many packers and storage operators to be beneficial in reducing moisture losses from the fruit during precooling. However, experimental evidence does not seem to verify these opinions.

For example, it was shown by Dewey (1) that rapid cooling was desirable to minimize moisture loss from freshly harvested fruits. In his study of water loss from the stems of grapes and cherries it was shown that slow cooling in still air with 90 per cent relative humidity caused greater moisture loss than rapid cooling in an air blast of 70 per cent relative humidity.

Rate of Air Movement

Previously, Pieniazek (5), in studying moisture loss from apples, had found that the rate of air movement had a negligible effect upon moisture loss and that the rate of loss was directly proportional to the vapor pressure deficit of the air. Since the vapor pressure differential between air in the precooling room and that in the intercellular spaces of the fruit decreases as the fruit is cooled to the air temperature the importance of rapid cooling of the product is apparent.

Curtains and liners provide some protection against moisture loss when grapes are stored under conditions of high air velocity and low atmospheric humidity. However, if air velocity is reduced to the minimum necessary to provide uniform temperatures after precooling and relative humidity is maintained at about 90 per cent such added protection should be unnecessary.

Summary

A study was conducted to determine the effect of packaging materials and package types on the rate of cooling of table grapes. Replicated lugs of packed grapes were subjected to refrigerated air at constant velocity by placing them in a dummy stack within an air tunnel. Fruit and air temperatures were taken during the test period by means of thermocouples.

The four types of bottom pads tested showed no significant differences in effect on rate of cooling.

When two-piece side liners were used in addition to bottom pads the cooling rate was lower than where pads alone were used.

Unitized interliners reduced the cooling rate below that obtained with side liners and pads.

Curtains, either ventilated or solid, materially reduced the cooling rate as compared with pads alone or pads and side liners.

The display lug with the side piece set 5/16 inch above the bottom gave somewhat faster cooling than the display lug assembled with the side piece flush with the bottom or the "Lodi" lug with sides the same width as the ends.

Comparable packages of grapes cooled faster with air at an average temperature of 38.5 F and velocity of 550 l.f.m. than with air averaging 32.7 F at 240 l.f.m.

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Butter Storage Study

STUDIES of stripping of boxes of butter in three refrigerated warehouses in Chicago, at the Central Cold Storage Co., Fulton Market Cold Storage Co., and Produce Terminal Cold Storage Co., have been made at the University of Illinois under direction of Dr. Paul Tracy.

In these studies, boxes of butter were stacked seven-high, five wide and seven deep. Initial temperature of the fresh butter was 50 and 62 F. In the stripped stacks 2 x 2 strips were used, with about two fingers of space between rows. Thermocouples were used to record temperatures. Storage temperatures were minus 10, minus 12 and minus 14 F in various rooms.

Under the conditions of handling in the Chicago plants, butter in stripped boxes reached 0 F in four days, regardless of position in the stack. In unstripped boxes, it reached zero in six days when one surface was exposed, and in 8 - 10 days when no surfaces were exposed. There was no difference in score of butter before and after storage in either the stripped or unstripped lots. Exposure of one or two surfaces made little difference in rate of cooling. The analytical data (bacteria, yeast, mold, fat, moisture, salt, curd, pH) were considered too limited in this experiment for significant summarization, although they were collected.

Government Buys Shell Eggs

THE U. S. Department of Agriculture on June 26 bought 54,440 cases of shell eggs as the final purchase under the surplus removal program announced April 9 and extended May 21 to continue through the month of June. Purchases for the entire program amount to 227,059 cases at a total cost of about $3,580,000.

The purchases were made with "Section 32" funds provided by Congress to encourage consumption of agricultural commodities by diverting surplus quantities of shell eggs from the market. The shell eggs will be distributed this fall to non-profit school lunch programs and other eligible outlets.

The quantities purchased and the prices paid for deliveries during each of the fall months were as follows: For September delivery, 125,739 cases at 49.50 cents to 55.00 cents per dozen; for October delivery, 83,320 cases at 51.74 cents to 55.90 cents; for November delivery, 17,000 cases at 53.45 cents to 56.00 cents; and for December delivery, 1,000 cases at 54.50 cents.

Controls Eased on MRO Items Under Regulation 5

THE National Production Authority, Department of Commerce, has amended CMP Regulation 5 to simplify industrial operations governing the procurement of maintenance, repair and operating (MRO) items under the Control Materials Plan. Effective immediately, the amendment to CMP Regulation 5 accomplishes the following:

1. Removes the $1,000 limitation on the cost or quantity of materials used for a single installation project, but retains the quarterly restrictions on expenditures for installations. NPA pointed out that, under this provision, only the actual cost of materials used to install equipment in a plant need be charged against the installation quota. The value of the piece of equipment installed is not controlling.

2. Changes the definition of installation to include any setting up or relocation of machinery, fixtures or equipment which does not occur in conjunction with a construction project covered by CMP Regulation 6, and which is carried as capital according to established practice.

3. Provides that where an installation is made in a building which has been completed less than a year and where the installation is part of a construction project, it may not be considered as an installation within the meaning of the new definition.

4. Revises the definition of "minor capital additions" to make it clear that all items purchased as part of a single project or plan constitute one addition.

5. Requires persons who have historically treated installation or relocation as an operating supply to continue to do so.

Benefits anticipated as a result of the action, NPA said, are elimination of some hardships which have resulted from the present $1,000 limitation on individual installation projects, and a reduction in the paper work required of industry.

Council Drops Bills Regulating Refrigeration

THE Brooklyn city council has announced that bills dealing with the licensing and regulation of refrigeration and air conditioning equipment have been withdrawn. The bills would have required a licensed operator twenty-four hours a day on any premises in which refrigerating or air conditioning equipment with a combined capacity of ten tons or more was maintained.

The New Controls Law

THE bill extending economic controls was passed by Congress and signed by the President June 30. Of special interest to the refrigerating industry, the new law extends price controls to April 30, 1953, and declares the intent of Congress that controls should be suspended on any material or service where such factors as condition of supply, existence of below ceiling prices, historical volatility of prices, wage pressures, indicate decontrol is appropriate and will not have unstabilizing effects on business.

Wage and salary controls are extended to the same date, establishing a new tri-partite Wage Stabilization Board with equal representation from labor, industry and the public, with all members subject to confirmation by the Senate, but specifically prohibiting the new WSB from handling labor disputes. It lifts wage controls from all firms with eight or fewer employes, unless within 30 days the President certifies that the stabilization program requires continued wage control in a given industry or area. Whether or not concerns employing eight or less people will be freed from the provisions of wage controls depends upon how this latest provision is interpreted and administered.

Crushed Ice Preserves Their Catch For Florida Mackerel Fisherman

THE Florida mackerel fisherman has to also be an expert in refrigeration, or he can lose his shirt and a boatload of fish between the catch and the market. Perhaps the first requirement for a good fisherman is catching the fish; but the second and just as important one is the ability to deliver them in good condition.

When a fishing crew starts down the Miami River in search of mackerel, they never know whether they will be gone overnight or three or four days. So, if they are smart they usually carry between eight and ten thousand pounds of ice. This is almost a pound of ice for every pound of fish expected to be caught. If luck is extra good and they catch a full load the first night, some of this ice may be tossed overboard to make room for more fish. Ice is cheaper than fish. If luck is not so good and it takes two or three days to get a load of fish, it is far better to have the ice on hand instead of a half a cargo of spoiled fish.

Ice Plants

The ice used by these fishing boats is purchased from the Royal Palm Ice Co., Miami, by the Crosland Fisheries which furnishes the ice to the fishing boats free of charge to insure the fish arriving in good condition. Slightly over 200 tons of crushed ice and snow are used at the Miami fishery per month. This is about one-half snow and one-half crushed.

Both the Crosland Fisheries and the Royal Palm Ice Co. have branches at Marathon, Fla., 85 miles south of Miami. These branches use about 150 tons of ice a month. A big proportion of the ice made by the Marathon plant of the Royal Palm Co. is sold to fishermen. They have portable blowers there for blowing ice in boats directly from the dock.

Most mackerel fishing is done at night because the fish cannot see to avoid the nets as well then. Powerful searchlights on the boats are used to locate the beds of fish. When they are spotted, one end of the net is dropped over and the area is rapidly circled. Then the searchlights are used to frighten the fish so that they swim into the nets. When the net is pulled back into the boat with the fish in it, ice is thrown on them and these fish are never without ice again until they are purchased by customers at the retail sales counter.

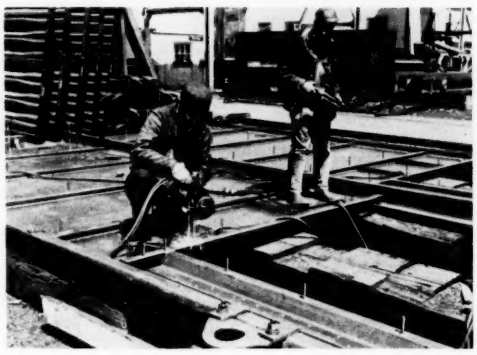
If the first haul brings in enough, the boat immediately heads back for the wholesale fishery. However, if luck is not so good, each fish must be removed from the net and iced down while the process is repeated until enough are caught.

When the boat reaches the fishery, the fish are unloaded and weighed to the wholesale dealer. There the job of cleaning, sorting, and packing begins at once. Some are packed whole and others as filets; but all are packed in fish boxes with alternating layers of ice and fish. While waiting for delivery, these iced boxes are kept in cold storage.

However, delivery is usually in a few hours and sometimes in minutes after the boats arrive. Miami restaurants often advertise that the fish they serve today slept in the ocean last night. If some technical chap insists that fish never sleep; they can still truthfully say that they swam in the ocean last night.

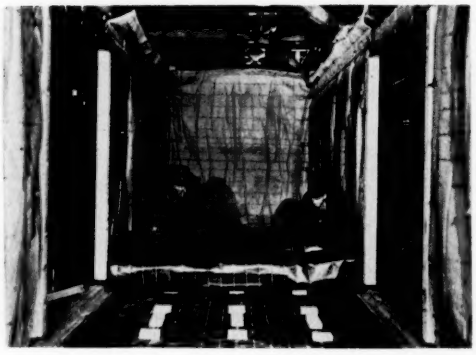
Mackerel Fishing in Florida. 1—In addition to several thousand pounds of ice these boats carry a crew of four and enough supplies to stay out several days. The last thing before departure is putting on a load of ice. 2—Showing part of the boat and two crew members. More ice has been added while the crew had a cup of coffee before bginning the job of removing fish from nets. 3—When the fishery takes over the fish are still covered with ice. 4—When cleaned the fillets are packed in boxes with alternating layers of ice and fillet. Whole fish are also packed the same way. 5—Fish arriving at the market are still covered in ice. These were placed on top to make photo. "Snow ice" is used by boats and fishery; but the markets usually use small chunks called "nut ice." The snow is good for covering in a hurry and also runs together to form a solid sheet of ice protection. The market prefers the "nut" style because it does not run togther and fish may be moved about in it more readily. 6—These mackerel are in the counter and waiting for a customer less than twelve hours after leaving the ocean. Fish being a water inhabitant are much better off with ice than with mechanical refrigeration. They will keep several times as long with ice.

Assembly Line Produces New Refrigerator Cars

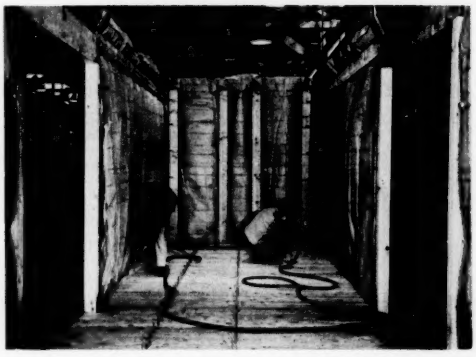


Welding steel bolts to steel sides. Bolts secure insulation and side paneling in refrigerator cars.

Fitting a steel side to the underframe of a new refrigerator car.

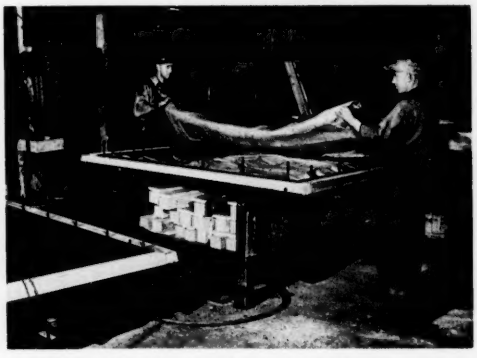


Applying second layer hair insulation to the floor. At top of car, belt rails are in place, holding double layers of fibre glass insulation to sides. Stud bolts protrude through insulation.

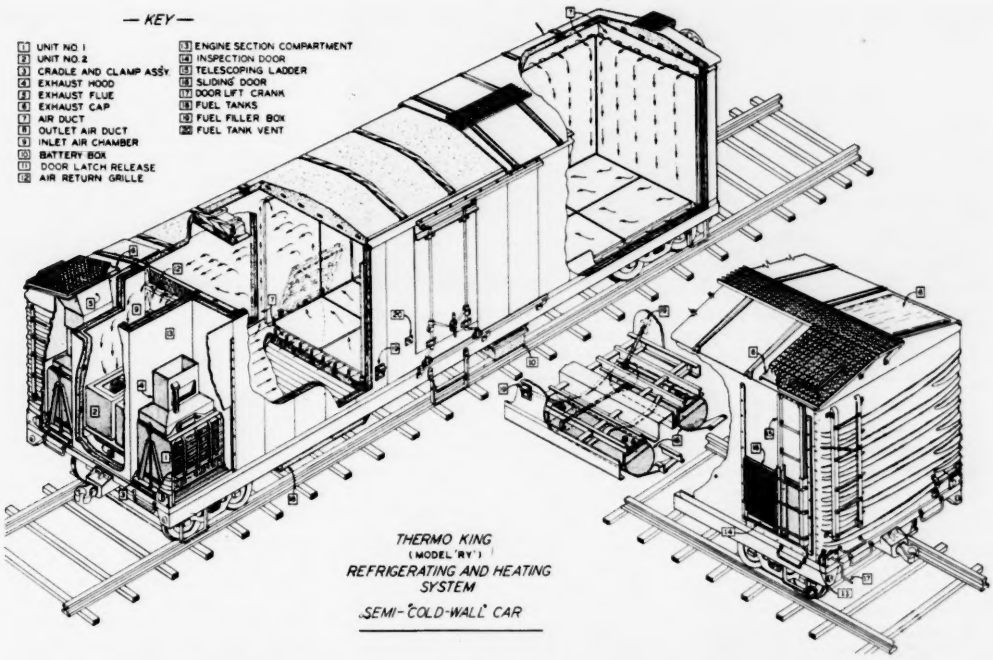


Pneumatic hammers are used to nail decking. End vertical posts are in place. This section is one of 105 different stations required in building refrigerator cars.

Applying finish lining to interior of refrigerator car. Pictures courtesy Pacific Car & Foundry Co.



Applying fibre glass insulation in sliding door of refrigerator car.



Meat Packer Introduces New Mechanical Refrigerator Car For Fresh Meats

Regular service from the midwest to Florida for a mechanically refrigerated railway car for fresh meats has been inaugurated by John Morrell and Company, meat packers of Ottuma, Iowa. For the initial shipment in May, the new "reefer" was loaded with fresh beef, lamb and pork, bacon, ham, and canned meats from the Morrell plant at Sioux Falls, S. D.

First of 25 Cars

This is the first of 25 cars to be equipped with Thermo-King mechanical refrigerating-heating units. The equipment is completely automatic, and any desired temperature may be maintained by simply setting a dial. The cars were built by the Mather Stock Car Company, Chicago.

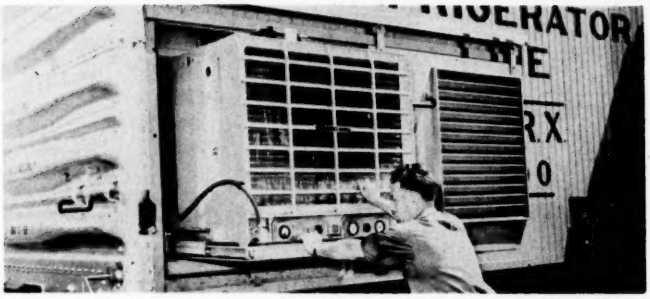
The Morrell firm is the first to adopt the new self-contained units for refrigerator cars. The "packaged" refrigeration units are similar to the Thermo-King units which the Morrell firm uses for refrigerating its over-the-road trucks.

A "Shakedown" run made with the new car, carrying a full load of meat, showed perfect control of temperature with only a two degree variation between the top and bottom of the cargo. Morrell traffic officials said there was no condensation inside the car, and that the meat arrived in noticeably better condition.

The refrigerating-heating system is comprised of two completely self-contained units installed at the end of the car. For each unit there is a slide-drawer type of mounting base anchored to the car. When a unit is to be installed this base is pulled outward and the unit is placed on it. Two quick-disconnect type connections are made for fuel and automatic controls, then the unit is rolled into place.

A feature of the Model RY is its ability to provide heat, using the heat pump principle. If the outside temperature falls below the temp-

New refrigerator car equipped with Thermo King mechanical refrigerating units. Car is leased from Mather Stock Car Co. by John Morrell & Company. Car was placed in service in May, and is the first of a number of similar cars to be placed in operation.



Engineer of Thermo King Railway Corp., Minneapolis, rolls mechanical refrigeration unit into place in car operated by John Morrell & Co. Completely self-contained, packaged refrigeration unit can be removed from car or installed in 15 minutes. Unit rests on shock resistant mounting base.

erature being maintained in the car, the unit may be converted to a heater by simply snapping a switch. A set of thermometers located near the master control panel shows the temperature at top and bottom points in the car.

Two fuel tanks under the car provide enough fuel for a cross-country trip. Batteries for each unit are housed in covered boxes at each side of the car. The are kept charged by the generator in the unit.

Complete Package Unit

The refrigerating unit itself is a complete package easily removable from the car. An insulated bulkhead separates the unit compartment from the loading area. A blower forces air through the evaporator (cooling coil), out under the floor racks, up through ducts in the walls and doors, and back to the evaporator through a grille in the upper part of the bulkhead. The sidewall ducts end about one foot under the ceiling, and the return air is drawn over the load on its way back to the evaporator. This type of car construction is termed a "semi cold-wall".

The packaged refrigerating-heating unit is itself composed of two compartments. In one section are the engine, direct driven compressor, condenser, radiator, and controls. The second section contains the evaporator and the blower. As a complete package weighing about 1100 pounds, the unit may be replaced by a spare unit in less than 15 minutes.

Modern Freezer Storage Building

A modern four-story reinforced concrete and brick freezer storage building, 65 x 130 x 70 feet high is being constructed by the Midwest Cold Storage & Ice Corp., Kansas City, Kansas. It is expected to be ready for occupancy in October, 1952. Above is shown an artist's drawing of the structure as it will be when completed.

Cooling Panel Performance

INTERNAL radiation emitted from electric lighting filaments may constitute a major portion of the total cooling load, Merl Baker, assistant professor of mechanical engineering at the University of Kentucky, declared at the semi-annual meeting of The American Society of Heating and Ventilating Engineers at Spring Lake, N. M.

Prof. Baker said that for structures not equipped with cooling panels, the effectiveness of this energy in heating the room air varies with the equivalent overall conductance of the enclosure and ranges approximately from 96 to 68 percent for good and poor insulations, respectively.

"By use of cooling panels possessing a conventional finish," he pointed out, "these values decrease appreciably, ranging from approximately 62 to 48 percent. A further decrease to approximately 52 to 45 percent is accompanied by use of a heat-absorbing panel surface."

In presenting his theoretical analysis of the removal of internal radiation by use of cooling panels, Prof. Baker gave equations he had developed which he said enable the determination of the effectiveness of enclosed radiant energy sources in heating the room air, together with expression for the cooling load requirements.

"From the established relationships both the panel cooling and the convective load components may be calculated for any given panel temperature, or the required panel temperature may be computed in accordance with the comfort equation," said Prof. Baker.

A cooling panel intercepting one-half of the radiation from a light source, directly absorbs approximately 23 and 37 percent of the electrical input to the lights when the enclosure surfaces possess an absorptivity value of 0.5 with a panel absorptivity of 0.5 and 0.8 respectively, Prof. Baker declared.

"These values are independent of the panel temperature," he said. "By use of a panel at a temperature no lower than of the room air an additional increase in energy removal is achieved by radiation between the enclosure surface and the panel. This component is equal to approximately 1 Btu per (hr) (F deg) for each square foot of panel surface.

"The effectiveness of the lighting load in heating the air is independent of panel surface temperature, and decreases with the equivalent conductance, panel absorptivity, and the light to panel shape factor."

THE ICE INDUSTRY

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33,789,502 TONS OF ICE SOLD IN 1951

Annual survey for 1951 shows more sales than in 1950 of processed ice, cubes, crushed, and sized ice. Total sales only .31 of 1 percent less than in 1950

THIS MONTH IN BRIEF

An annual report by the National Association of Ice Industries shows that 33,789,502 tons of ice were sold during 1951, a decrease of only .32 of 1 percent from 1950. Sales of processed ice showed an increase of 7.75 percent over 1950.

All price controls on ice have been removed by the Office of Price Stabilization, effective June 27. The order also removes controls from certain canned and frozen fruit items.

An iced vegetable counter attracted favorable attention at the recent annual convention of the National Association of Retail Grocers held in Miami, Florida.

A new type ice refrigerated divider, made of wire mesh as a container for crushed ice, has been designed for fresh fruit and vegetable counters.

An ice distributor who has had experience with ice vendors tells why customers like them and how they reduce distribution costs.

THE annual report on sales of ice compiled by the National Association of Ice Industries shows a much more optimistic picture for 1951 than was presented at the annual ice convention at Houston last November, when it was predicted that there would be a decline of about five percent over 1950. The actual figures, according to the report, show a very slight decline of all ice sold of only .32 of 1 percent. And sales of processed ice, ice cubes, sized ice and crushed ice all showed increases over 1950, ranging from 2.19 to 11.02 percent. These figures were supplied by more than 2,000 ice plants which cooperated in the annual survey and which represent an authentic cross-section of all parts of the country.

Compared With 1950

Placed alongside the 1950 survey, the report states, these figures are most encouraging. They may well mean that, on a nationwide scale, the ice industry has reached a vital turning point. Though another year or two will have to pass before definite judgement can be formed, it appears possible that the downward trend of the post-war years has been checked, that a levelling-off stage has been attained. The next trend can and should be up.

Again, this must be stated: The iceman who finds the report in wide contrast to the course of his own business for 1951 should remember that these are average statistics for more than 2,000 U. S. plants, and thus faithfully represent conditions throughout the country as a whole.

The cheering aspect of the compilation is sharply underlined by the Division tonnage totals listed in Table 1. During the three years 1948-50 not one Division reported an increase, but in 1951 four did. True, the weather played a part, notably in the case of the Southwestern Division, which enjoyed one of its old-fashioned, hot summers. But the "plus" Divisions are perhaps not as significant as the "minus" areas, for in the latter, even

1951 Ice Sales

Total sales—33,789,502 tons
.32 of 1 percent less than 1950

Processed ice—4,289,433 tons
7.75 percent more than 1950

Ice cubes—760,498 tons
2.91 percent more than 1950

Sized ice—1,913,955 tons
7.09 percent more than 1950

Crushed ice—1,614,982 tons
11.02 percent more than 1950

Natural ice—209,495 tons
.62 percent ot total sales
16.3 percent less than 1950

Operating load factor was:
38.23 percent for 1951
1.12 percent more than 1950

Total daily production capacity of plants in active operation was 242,170 tons, 3.24 percent less than in 1950.

Total ice storage space in use was 3,167,394 tons, 12.74 percent less than in 1950.

with temperatures comparable to those of 1950, the tonnage decline was nowhere near as severe. In fact, the largest drop—5.36 percent in the Great Lakes Division—was less than the smallest drop (8.13 percent) of the previous year. The over-all national decline of .32 percent is so scant that the allowable margin of error could eliminate it altogether.

Little, if any, of the levelling-off could be attributed to the defense program initiated since the start of hostilities in Korea. The Far Eastern "police action" has not to date caused a speed-up of industry, drafting of manpower, or reopening of armed forces installations on a scale anywhere approaching that of World War II. Judging from correspondence to the National Association, ice companies currently noting any war-inspired prosperity are extremely few and far between.

It is worth observing that the 1951 tonnage is 3½ million tons above that of 1940, the last year counted as normal. It is also nearly a million tons above the 1920 tonnage.

Processed Ice Sales

Exceptionally gratifying are the figures on processed ice sales for 1951 (Table 2). Last year comfort was taken from the fact that this type of sale had fallen off only 4.5 percent from 1949 to 1950. The progress in 1951 was of a more positive nature, a substantial increase. The rise of 7.75 percent gives a margin of more than three percent above 1949. Not only have the 1950 losses been recouped, but a further upward climb has begun.

Sales of crushed ice made a spectacular 11.02 percent advance over 1950, closely followed by the 7.09 percent increase in sized ice tonnage. While ice cube sales rose only 2.91 percent, this was a good reversal over 1950 when they showed a larger decline than either of the other two prepared forms. Tonnage-wise, sized ice was the best seller of the three in 1951, pushing within an easy jump of the two-million-ton mark.

Crushed ice sales moved up most rapidly in the Southwestern Division (129,136 ton increase). The Great Lakes Division showed the most sizeable gain in sized ice sales (22,768 tons) and the Pacific Coast Division stepped up ice cube sales most with a 9,428-ton advance.

Only in the New England Division

TABLE 1—TOTAL ICE SALES IN UNITED STATES FROM 1947 THROUGH 1951

Division	1947 Tons	% Change Over 1946	1948 Tons	% Change Over 1947	1949 Tons	% Change Over 1948	1950 Tons	% Change Over 1949	1951 Tons	% Change Over 1950
New England	2,774,236	—1.01	2,303,430	—16.61	2,202,420	— 4.31	1,681,771	—23.63	1,692,702	+ .65
Eastern States	10,105,640	—3.17	8,805,881	—12.75	8,089,142	— 8.07	6,443,032	—20.34	6,356,051	— 1.35
Southeastern	6,652,239	—4.48	6,189,128	— 6.94	5,508,501	—10.93	4,563,314	—17.15	4,570,615	+ .16
Southern	4,143,612	—1.52	3,956,031	— 4.53	3,334,003	—15.66	2,649,015	—20.54	2,608,750	— 1.52
Southwestern	6,387,024	—2.19	5,934,605	— 7.08	4,826,535	—18.61	4,248,922	—11.96	4,828,050	+13.63
Great Lakes	10,184,773	—4.70	8,728,344	—14.28	7,616,718	—12.67	5,960,862	—21.73	5,641,360	— 5.36
Western	4,353,010	—2.55	3,757,786	—13.63	3,222,875	—14.17	2,580,702	—19.92	2,512,571	— 2.64
Mountain States	1,749,371	+1.70	1,573,569	—10.04	1,379,608	—12.26	1,063,307	—22.92	1,055,332	— .75
Pacific Coast	5,808,698	—0.15	5,080,038	—12.53	4,576,302	— 9.84	4,204,076	— 8.13	3,998,497	— 4.89
Northwestern	806,018	+0.41	661,400	—16.71	586,354	—11.28	502,797	—14.25	525,574	+ 4.53
TOTAL U. S.	52,964,621	—2.81	46,990,212	—11.28	41,342,458	—12.01	33,897,798	—18.00	33,789,502	— .32

TABLE 2—TOTAL ESTIMATED SALES OF PROCESSED ICE IN TONS

Division	Ice Cubes 1949	Ice Cubes 1950	Ice Cubes 1951	Sized Ice 1949	Sized Ice 1950	Sized Ice 1951	Crushed Ice 1949	Crushed Ice 1950	Crushed Ice 1951
New England	67,532	58,468	59,766	56,643	50,772	52,813	66,087	53,791	56,997
Eastern States	252,691	217,543	221,959	450,266	411,597	431,271	209,472	170,799	189,501
Southeastern	66,224	65,856	70,631	267,403	268,424	283,509	170,873	153,096	165,436
Southern	9,990	9,648	8,285	67,777	67,825	83,764	49,956	43,903	46,875
Southwestern	16,225	14,967	15,067	165,663	157,947	179,996	456,598	491,013	620,149
Great Lakes	178,942	159,774	155,732	437,251	428,781	451,549	273,524	228,006	227,071
Western	77,209	72,985	78,788	168,435	162,331	173,029	159,812	160,249	152,397
Mountain States	14,135	12,268	12,036	46,791	43,806	42,045	20,177	25,166	26,069
Pacific Coast	123,396	126,888	136,316	177,133	175,488	194,669	52,660	62,309	64,733
Northwestern	897	602	1,918	20,881	20,324	21,308	44,944	66,391	65,754
TOTAL U. S.	807,331	738,999	760,498	1,858,243	1,787,295	1,913,953	1,504,103	1,454,723	1,614,982
% Change Over Preceding Year	—4.877%	—8.46%	+2.91%	+2.80%	—3.81%	+7.09%	+4.86%	—3.28%	+11.02%

TABLE 3—PERCENTAGE OF COMPANIES PROVIDING PROCESSED ICE SERVICE

Division	Percentage Of Reporting Companies Providing Ice Cube Service 1949 %	Ice Cube Service 1950 %	Ice Cube Service 1951 %	Sized Ice Service 1949 %	Sized Ice Service 1950 %	Sized Ice Service 1951 %	Crushed Ice Service 1949 %	Crushed Ice Service 1950 %	Crushed Ice Service 1951 %
New England	65.6	62.2	80.9	53.1	40.5	57.1	65.6	73.0	57.1
Eastern States	38.8	42.7	38.0	40.8	41.7	46.0	56.3	61.5	45.0
Southeastern	12.5	16.7	17.3	25.1	33.3	29.1	62.2	70.2	72.7
Southern	11.5	11.8	12.7	29.5	34.2	36.4	57.7	56.6	63.6
Southwestern	15.7	12.2	12.1	21.9	24.3	31.3	73.2	75.7	63.8
Great Lakes	48.0	53.7	55.9	44.1	48.3	50.8	56.4	59.9	55.1
Western	29.7	33.3	46.3	35.6	37.5	46.3	60.2	64.6	67.2
Mountain States	52.2	36.8	58.8	43.5	42.1	41.2	65.2	63.2	82.4
Pacific Coast	62.1	70.6	64.0	37.8	32.4	28.0	54.1	47.1	44.0
Northwestern	22.7	23.5	23.1	45.4	52.9	53.8	54.5	47.1	30.7
TOTAL U. S.	31.76%	34.8%	36.6%	35.46%	38.3%	41.1%	60.33%	63.5%	59.6%

did ice cube sales exceed sales of both sized ice and crushed ice. In the Eastern States and the Pacific Coast Divisions sales of ice cubes topped crushed ice sales, but in all other Divisions ice cube sales ran well back in third place.

The percentage of companies providing processed ice service (Table 3) continues to increase slowly but steadily, with the gains in ice cube and sized ice service about the same as those of 1950. The figure indicating that fewer companies now provide crushed ice service than before must be discounted; obviously, no company which had begun to produce crushed ice stopped doing so. Probably the discrepancy is the result of different companies responding to the poll this year than last.

In 1948 only 25.3 percent of U. S. ice companies made sized ice available to their customers; in 1951, 41.1 percent of the companies did. In three Divisions, New England, Western, and Mountain States, ice cube service increased substantially between 1950 and 1951.

This swing to processed ice service shows a growing awareness on the part of icemen to the needs of their customers, as well as an expanding interest in higher income per ton. Our figures on dollar volume reflected a small increase in revenue per ton in 1951, which is in line with the price increase reported in the ICE AND REFRIGERATION survey (May 1952). Although tonnage was down slightly, gross revenue showed an increase over the preceding year. This was due in part to the fact that ice prices advanced a little in 1951, and that more processed, or premium-priced, ice was sold. The processed forms of ice, by the way, are a commodity which meets the customer's need. The iceman in setting up this service should realize this and establish prices that will enable him to give his trade efficient, dependable service at a profit.

Research Pays Off

Evidence piles up that the findings of the last two years' national ice research are paying off in direct sales. The new method of packaging sweet corn with ice in paper bags for local shipment has caught on in one corn-growing area after another. The ice

industry's vigorous merchandising and publicity of this method have been effectively backed by cooperative promotion from other interested organizations. The combination meat display method, too, is making rapid strides in many sections, thanks to the efforts of progressive ice companies. At latest reports some 800 markets in California have been sold on meat icing, a challenge to icemen in other states. Also, national ice advertising and publicity plus local salesmanship are furthering the hydro-cooling of numerous commodities.

Another spring of below-average temperatures is already on the record for 1952. But most of the summer lies ahead and the above average June temperatures so far give some promise of a good ice year. With new markets open, with more and more ice companies able to serve those markets, with proved merchandising and selling tools available for their use, this year can be a historic, upswing year for the entire industry.

Price Controls on Ice Removed

ALL price controls on ice have been removed by the Office of Price Stabilization, effective June 27. This action was taken in Amendment 1 to General Overriding Regulation 7, Revision 1. The order also removes certain price controls from certain canned and frozen fruit, berry and vegetable products. A summary of the order follows:

It was the experience of the Office of Price Administration that a constant sequence of individual and area price adjustments was necessary to bring ice prices up to a level which would secure the continuation of an ice supply in various communities. In numerous cases annual adjustments were necessary to prevent substantial hardship in the face of increased costs and decline in volume. The same experience has begun to repeat itself since the institution of price controls in January, 1951.

The making of these numerous price adjustments has placed a substantial administrative burden of reporting, compiling of financial information and of record maintenance upon the ice industry. Processing these adjustment applications has required a considerable expenditure of manpower on the part of OPS. Moreover, the continuation of control involves technical complexities such as provisions for the importation of ice into areas formerly served by companies which have gone out of business. The prospect, in the absence of decontrol, is for these administrative burdens to increase rather than lessen with the passage of time.

It is highly unlikely that uncontrolled ice prices will increase to levels above those which the agency would be compelled by the requirements of the law to establish through numerous adjustments. Therefore, the Director has concluded that the advantages to economic stabilization which can be derived by a continuation of controls upon ice are not commensurate with the burdens placed on the industry and upon the agency.

Canned and Frozen Fruit, Berry and Vegetable Products

The canned fruits, berries and vegetables exempted by this amendment are either luxury items of limited volume, such as canned celery, or are items produced in limited quantities and sold almost entirely for remanufacturing purposes the final product of which remains under control, or are items packed regionally in small volume, or, finally, are specialty fruit items. In regard to all these products the number of processors is very small and the total pack of all products amounts to less than 2/10 of one percent of all fruits and vegetables which are packed during a year.

The frozen fruits, berries, and vegetables exempted from price control by this amendment are an insignificant part of the total frozen fruit, berry and vegetable pack. The frozen vegetables covered by this action constituted but 2.046 percent of the total frozen vegetables pack during 1951, while the frozen fruits and berries constituted 0.455 percent of the total frozen fruit and berry pack for that year. Many of the listed products have not been packed at all during the past two years, apparently because of the lack of consumer demand, while others are sold in particular regions but not in large volume.

Therefore, the commodities exempted by this amendment are of minor significance and have but a trifling effect on the cost of living, the cost of the defense effort or the general current of industrial costs. Futhermore, any ceiling price restrictions imposed on these products would involve an administrative enforcement burden out of proportion to the importance of keeping such commodities under price control.

In formulating this amendment, the Director of Price Stabilization has consulted with industry representatives, including trade association representatives, to the extent practicable and has given full consideration to their recommendations. In his judgment the exemptions provided by the accompanying amendment will in no way defeat or impair the price stabilization program or the objectives of the Defense Production Act of 1950.

The Ice Industry

Refrigeration Keeps Sweet Corn Sweeter

FURTHER improvement in the refrigerated shipment of Florida-grown fresh sweet corn to northern markets is now possible as a result of recent U. S. Department of Agriculture research findings. Fresh sweet corn is considered by shippers to be one of the most perishable of all vegetables.

Thirty years or more ago scientists showed that as much sugar is lost in three or four hours at 86 F. as in 22 hours at 50 F. or as in four days at 32 F. Means of cooling have been improved gradually and over the years the marketing of crated sweet corn from the Florida area has rapidly increased—from four carloads in 1941 to 5,400 carloads in 1951, or 740 percent, an indication that improved handling has given the consumer a satisfactory product.

According to J. R. Winston, Randall Cubbedge, and Jacob Kaufman, specialists in research on handling, transportation, and storage of fruits and vegetables for the Bureau of Plant Industry, Soils, and Agricultural Engineering, there has been little exact knowledge on the temperatures obtained by methods now in use for refrigerating sweet corn, that is hyrocooling (cooling with water), topping loads with ice, and using ice in bunkers. As a result of studies made possible by the cooperation of various individual growers and shippers and their cooperative associations, however, the research men now feel justified in recommending six practices they have found will put sweet corn on the market in better texture, sweeter, and in condition to stay that way longer if properly held.

The six recommended practices, any of which may be used alone or in combination with one or more of the others, are:

1—Precool corn before crating.

2—Precool corn right after picking to 40 F.

3—Use the smaller of two standard crates.

4—Use care with fan ventilation.

5—Put crates in cars on crisscross plan for better air circulation.

6—Top ice cars as heavily as possible.

All these recommendations point up to better ways of refrigeration. The comment of the research men is that "sweet corn cannot be improved in flavor after picking, but better refrigeration keeps the sugary kind from deteriorating into starchy corn."

Brochure Meets Claims of Automatic Ice Makers

MEETING head-on the competitive activities of the automatic ice makers the Peoples Ice Company, Syracuse, N. Y., has issued a four-page brochure "What's the Truth About Automatic Ice Makers."

On the front page it warns ice users that unless the ice they use in their business is pure, crystal-clear, odor and tastefree, hard frozen and slow melting, it may cause loss of business, may drive customers to a competitor, or send them home for a "good drink."

Continuing on pages two and three, it specifies selling arguments for ice plant ice—People's ice is cheap at any price if it creates business and makes a profit. It advises the ice user to get plenty of ice at all times and know what the cost is. Home ice makers, it says, requires a sizeable investment, additional plumbing for installation, rent of expensive store space and labor for its upkeep. Personnel in charge often neglect to care for the machine, often resulting in unnecessary breakdowns, the risk of leaking gas, and expensive repairs. In addition to the first cost maintenance will average about $100 a year. Depreciation is very heavy and service is very uncertain. Spare parts are often not available. Power and water costs are a small item in the cost of operation.

Advantages of People's ice cubes are listed in these points: perfect shape and uniform size makes for economical use; slow melting makes them last longer; crystal clear cubes add to appearance of drinks; in standard sizes, they fit popular glass sizes; for more economical use, nut-sizes cracked ice is available.

On the back page are listed 43 ice service stations in Syracuse and suburbs where ice cubes and sized ice may be purchased.

Korean Ice Plant Provides Morale Booster for GIs

HE MAY be one of the coldest men in the 7th Infantry Division in Korea, but Cpl. Earl Schmidt of Alton, Ill. is one of the most popular. The Illinoisan who recently arrived in Korea is operating one of the division's ice freezing units. He is a member of the 7th Quartermaster Company, which has set up five of the units near the front lines. Each of them turns out a ton of ice each day.

A seven-ton ice house, made of sandbags, wood and insulating material in the side of a hill, serves for storage purposes. The engineers erected a huge wooden frame to hold a collapsible 3,000-gallon water tank, which feeds the freezing units. The ice provides cool drinks for the troops, and also protects perishable food. It is a great morale booster for the men.

Ice Display At Grocers' Convention

MEAT on Ice took a front seat in the NAII booth at the recent annual convention of the National Association of Retail Grocers in Miami. Reprints of a meat icing article were handed to a good number of the 14,000 grocers who attended. The display also featured an 8-foot display of iced produce, a salad bar, and a case stocked with chickens on ice. John G. Pool of the NAII staff managed the booth.

New Divider Increases Efficiency of Ice In Vegetable and Fruit Counters

A NEW type icer for cooling and maintaining moisture in produce cases and counters was introduced at regional produce meetings in Detroit, Oklahoma City, Boston and Los Angeles. It is being marketed under the registered trade name of "Nest-Ice-Pak" by the Folding Carrier Corp. This icer has application in all types of produce cases and counters using refrigeration, as well as those with no special provision for cooling.

The device is made of close wire mesh, as shown in accompanying picture, expandable from 28½ to 38½ inches to fit various sizes of counters and cases. It is three inches wide and seven inches high, with special attached legs which may be used to raise it about three inches. It is attractive in appearance, made of electro-zinc-plated, mesh wire with a luster-retaining and corrosion-resisting super-coating same as used in refrigerators and freezers.

"Nest-Ice-Pak" for produce cases and counters, is filled with crushed ice. After being filled it is set into the produce case and enhances the display, prevents dehydration of vegetables and fruits, and cuts icing costs. These "Nest-Ice-Paks" telescopes from 28½ to 38½ inches to fit into all types of counters and cases.

Cool Moist Air

When filled with crushed ice it is placed in the vegetable and fruit counter and serves as a divider between the rows of vegetables and fruits. The idea back of it, according to Kurt H. Schweitzer, vice president and general manager of the company, is to utilize the fact that air naturally flows downward and side-ways. This natural flow of cool, moist air moves into and through the produce.

Actual store tests, it is stated, have shown this principle quite efficient in keeping fruits and vegetables fresh and colors bright. When used with fruits, the retained cool temperature not only reduces loss through spoilage and shrinkage but also keeps fruit flies away from the display.

Store Profits

According to Anthony G. Conn, produce merchandise manager at Wrigley's Stores, Inc., Detroit, Mich., the use of these new ice-separators "took us out of gross profit troubles in our produce departments." Mr. Conn says that since 70 to 80 percent of produce is moisture, and quick dehydration causes spoilage, the use of the ice-separators with the resultant cool humidification not only reduced the spoilage but also furnished better looking displays that sold more produce. The produce not only looks garden-fresh and color-bright, he said, but the cool whiteness of the crushed ice provides strong contrast to the natural greens of vegetables, the deep colors of tomatoes, egg plant, rhubarb, and the bright colors of radishes, carrots, and even strawberries.

Less Temperature Variation

The tests also showed a reduction of temperature variations from the bottom to the top of the display, the variation from the bottom to top being only 6 to 8 degrees.

Another important advantage is the elimination of sprinkling and spraying to maintain proper moisture content. While moisture thoroughly permeates the displayed produce and thus tends to increase the weight, it is not seen by the consumer like it is with spraying.

The container can be tightly packed with crushed ice in the back room and placed in the produce counter. Since this icer should be heaped with ice above the level of the produce, it has been provided with an adjustable leg in the back. This can be used for week-end displays or for special displays, or when large amounts of produce are displayed. For smaller displays it can be folded back against the mesh. After it is placed in the produce case, crushed ice should be added periodically to keep the level of the ice above the produce.

Eliminates "Digging"

An unexpected advantage of this new icer is the discouragement of "digging to the bottom of produce displays by customers in order to get the coolest, freshest vegetables. This eliminates damage through handling because the top layer always looks fresh and colorful.

These new ice-separators have also been successfully used in meat display cases where the moisture keeps the meat bright in color.

The Ice Industry

Ice Company Found Guilty of Restraining Trade

THE Atlantic Ice Company, two of its officers, and four of its affiliated companies were found guilty of restraining trade, in Federal Court at Macon, Ga. Judge T. Hoyt Davis ruled the companies restrained trade through an agreement with each other and their competitors. A jury found the defendants not guilty after a criminal trial on similar charges in November, 1950. This case was a civil suit by the Government at the same time the criminal indictment was returned in 1950.

Named with the Atlantice Company as defendants were the City Ice Co. of Columbia, S. C.; City Ice Delivery Co. of Charlotte, N. C.; Ice Service Co. of St. Petersburg, Fla.; Southern United Ice Co. of Jackson, Miss.; Fred W. Beasley, chairman of the board of the Atlantic Company, and Clinton D. Castleberry, president of the Atlantic Co.

Two Civil Suits Dismissed

The Government had dismissed the civil suit against two of the defendants acquitted by the jury in the crminial case and dropped additional charges that the remaining defendants had violated a second section of the Sherman Act by conspiring to monopolize and attempting to monopolize the ice industry in the Southeast. The defendants dismissed were Chattanooga Ice Delivery Co. of Chattanooga, and Orlando Ice Delivery Co. of Orlando, Fla.

The civil case was submitted to Judge Davis without a further trial on the basis of the record of the criminal trial.

In his findings, Judge Davis said the defendants had entered into agreements with each other and with their competitors to allocate territory and customers and that these agreements affected competition for sale to local consumers and to express companies.

"During the conspiracy," the decision said, "there was no substantial competition in sale of ice or furnishing of ice services" in the areas served by the defendants.

"The over-all plan of defendants and others was to adjust the available supply of ice designed for a particular market to the demand at that time in order to stabilize prices. Defendants acted in concert with each other and with competitor ice companies to prevent any surplus ice from reaching their markets."

The judge said the defendants entered into agreements with each other and with competitors to fix prices, probate markets by pooling all ice produced in an area for sale through delivery companies controlled by competing companies, to curtail production capacity by buying competing plants, reducing their capacity by junking them and getting agreements from eliminated competitors not to compete again in the territory for a period of years.

New Ice Plant Provides Ice for Vegetables

AFTER leaving a chemical manufacturing business in Chicago to take things easy in a summer home near Denver, Colo., Mark J. Fields heard that the town of Grants, N. M. needed an ice plant. He went there last October to organize the Grants Ice & Development Company. Construction of the $250,000 ice plant was expected to be completed in time for this summer's crops.

Iced Tea for Delegates

FREE iced tea was provided delegates and guests at the Republican National Convention at Chicago by the Tea Bureau. The Bureau figured it could not lose no matter what happened in Chicago; whoever won the nomination, it thought, was almost sure to be a tea man. Generals Eisenhower and MacArthur had previously received golden teapot awards as outstanding tea drinkers. Senator Taft, too, is a tea drinker, the Bureau added.

Indiana Ice Plant Sold

THE ice and cold storage plant of the National Ice & Products Company, New Albany, Ind., has been purchased by the Floyd County Beverage Company, according to an announcement by N. V. Trautman, president. The new owners plan to discontinue the manufacture of ice and of local cold storage of fruit and potatoes, but expect to operate a number of small storage rooms for grocers, beer, and meat dealers. The frozen food locker plant was not sold and will continue under the same management and corporate name. Mr. Trautman has operated this plant very satisfactorily for thirty-one years.

Medford Personnel Changes

AFTER thirty-five years of service Major M. Morris has resigned as president and general manager of the Medford (Ore.) Ice & Storage Co. William Briggs, of Ashland, Ore., vice-president, has been named as the new president to replace him, and A. M. Collier of Klamath Falls, Ore., has been appointed to succeed Mr. Briggs as the new vice-president.

American Ice Dividend

THE American Ice Company has voted a dividend of $1.50 on the preferred stock of record July 11. Last year the company paid a total of $6.00, consisting of payments of $1.50 each in July and September and $3.00 in December.

American Service Moves to Atlanta Gunn Elected President

THE American Service Company, which has ice plants in 41 cities and operates in 12 states is in process of moving its headquarters from Kansas City, Mo., to Atlanta, Ga.

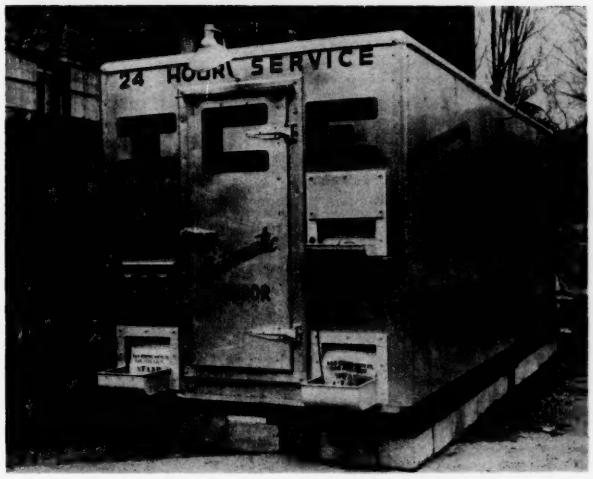
E. L. Gunn Jr., recently elected president of the company, following the death of Earl Smith Mulley June 4, said that one of the reasons for the move was that some 20 percent of the organization's total business originates in Atlanta. The company's operations extend from the Middle West and Southwest into the Southeast.

Besides ice plants in 41 cities, the company also distributes frozen foods and sells household appliances in a number of cities, including Atlanta. The headquarters office at Atlanta is at 879 Memorial Drive Southeast.

A graduate of Georgia Tech, Mr. Gunn is a native of Jacksonville, Fla. He joined American Service in 1929 and has spent virtually his entire time with the company in Atlanta. Before being made president, he had been vice-president in charge of operations since March, and was division manager before then. He has led in the company's diversification program. He has been an active member of the National Association of Ice Industries for several years, serving as chairman of the Operations Committee of National Ice Advertising, and was elected second vice-president of the association at the last convention at Houston.

Ice Vendors Sell Ice—Customers Like Them And They Cut Distribution Costs

Since ice vending machines require drive-in space they create immediately an atmosphere favorable to a "vending center." Here various products could be vended through some cooperative arrangement. Chilled bottled beverages in take-home packets, cigarettes and candy are among the items that should sell well here. Here, too, is the proving ground for many types of take-home packages for home consumption. Ice itself is primarily a home consumption item and proper placement of assorted vendors would, it seems, afford a substantial annual sales outlet for many home consumption products.



One of the automatic ice vendors put in service by Oscar Mayer & Company, Madison, Wisc.

ICE vending machines sell ice, the public likes them, and they effect big distribution savings for the ice company. This is the considered opinion of George W. Heath, manager of the Ice Division of Oscar Mayer & Company, Madison, Wis. His opinion is based upon operation of 13 vending machines in and around Madison. In the spring of 1950, five vendors were installed. Since then eight have been added. Seven of these are in the City of Madison and six in suburbs.

Emphasizing that the ice vendors rarely pay for themselves rapidly, he observed that one of his company's machines was expected to amortize its own cost in a year, but that most would take from three to five years. Vendors require constant attention, he continued, warning that the company must be prepared to service them, repair them, keep them in a good state of repair, and to keep the belts constantly filled. Things will go wrong. Many times he has had telephone calls in the middle of the night from someone who put in a quarter and didn't get 30 cents worth of ice.

Location

Location is important, he said, but there is no perfect formula for its selection. He told of putting a machine on a well-traveled highway between a super-market and a drive-in, with a filling station adjoining—ostensibly an ideal location. The vendor failed there, but when it was moved three blocks away, it developed into a top seller. Substantial traffic passing near a vendor is, however, a must. "We have four or five federal highways running through our town," he said, "Three of our vending machines are on these principal arteries. But last summer through traffic was rerouted to other highways so it would bypass the town. Business in those three vendors fell off as much as 50 percent. It is now going to be necessary for us to move one or two of those stations so they will be on the new highways, or to purchase additional machines to put there."

Annual Sales

Although it is difficult to predict how much, due to varying factors, vendors do sell ice. It is estimated that a machine in a good location, vending both block and processed ice, should sell 200 to 300 tons annually, and will be profitable if it does so. The fact that the machines dispense processed ice is considered one of their chief virtues, since the processed forms bring much higher profit than block ice.

Properly painted and illuminated, the ice vending station serves as an excellent advertising medium. The company uses each of its stations as a billboard, featuring the word "Ice" and the company trademark in large letters. At the highway locations a supplementary sign saying "Ice" in four-by-eight-foot letters draws a lot of passing trade.

Saves Delivery Costs

Savings in delivery costs is rated as the biggest benefit the company has derived from vendor installation. It had a policy of delivering ice almost any time, in any quantity, anywhere in the entire city. If someone called up and wanted 50 pounds of ice delivered at 6:00 p.m. he got it. Since the installation of vending machines, that type of special delivery has been eliminated.

The people like the machine service better, because they can get the ice as they want it, when they want it and where they want it. Even with an increase of 15 percent in labor rates during the past year, delivery expense was 10 percent below that of the previous year. All credit goes to the vendors, for there was no appreciable change in the amount of ice sold on the routes.

Mr. Heath said his company is sold on the idea of vending and they believe it is one of the finest merchandising media for ice that has been introduced for a long time. They expect to expand it to cover more of the towns which they serve. — The Coin Machine Journal.

The Ice Industry

Illinois Association Of Ice Industries

WM. D. WRIGHT, Secretary

BUSINESS in Illinois during the heated period has been good, particularly in processed ice. Facilities have been taxed to the utmost to take care of the demand and it is moving at a satisfactory price. Which proves what hot weather will do. We have heard of some price adjustments since price control has been removed. There has been no widespread shortage of ice. At some points it was necessary to purchase additional supply from other points for a short time.

Our members are cooperating with one another, this office is set up to keep in touch with stocks of ice and we feel sure that all reasonable demands will be met and that the public will not suffer even though the season may turn out to be one of exceptionally high temperatures. Employment holds up well, although there have been minor dislocations in those industries affected by the steel strike, transportation, coal, etc. The labor situation in the ice industry is very tight, not enough, quality not too good, many headaches. Our association has no meetings planned at this time. Everyone is busy with their personal problems.

The steri-cooling project in peaches is proceeding according to plan. The steri-cooler has been ordered by W. A. Hartline & Sons, Anna, Ill. and enough custom work has been promised to keep the machine in operation at least on an eight hour day and it is hoped that this volume will be increased.

Indiana Association of Ice Industries

TWO district merchandising meetings were held by Indiana ice men during the month of June, at the South Shore Inn, Lake Wawasee, and the Port Hole restaurant, New Castle, Ind. Both meetings were well attended and valuable information on merchandising and other ice company problems were exchanged. On June 24, a meeting was held at the Blue River Country Club, Shelbyville, Ind., for the purpose of discussing uniform accounting practices in the ice industry. At this meeting also, much valuable information was obtained by those who attended.

Canadian Ice Advertising

AN EDITORIAL in the Canadian Ice Letter of the Canadian Association of Ice Industries says that the power of Canadian National Ice Advertising grows every year, which fact can be proven by circulation figures of publications in which ice advertisements appear. April, May and June saw the greatest concentration of ice advertising ever released by the Canadian Ice Foundation. Newspapers in 26 major centers carried advertising through these three months. And, such powerful mass consumer magazines as the Chatelaine, New Liberty, Canadian Home Journal, Le Petit Journal and the Star Weekly penetrated the ice story into every community across the Dominion.

During these three months the amazing total of 117 individual advertisements have appeared in these publications, driving home the advantages of "natural moist-cold" refrigeration, and the enjoyment of fresh, vitamin-rich, full-flavored foods.

It is not possible to match the colossal advertitsing and sales promotion expenditures of the large corporations which manufacture mechanical refrigerators, but it is a constant saitsfaction and stimulant to every subscriber to Canadian Ice Foundation that a continuing, united, national effort is being made to keep the Canadian public sold on ice and ice refrigerators.

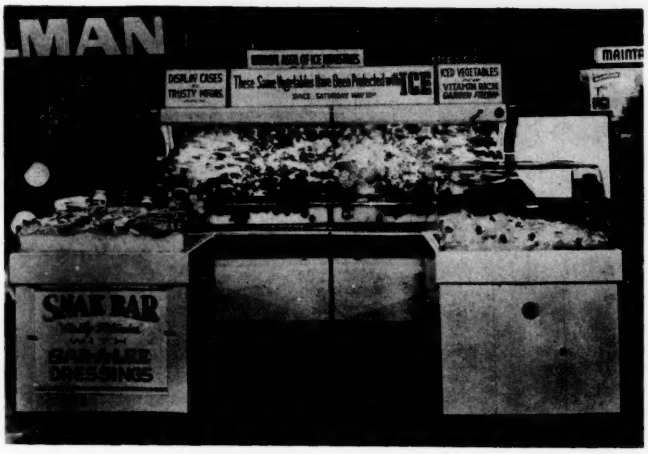
Plans are now being formed for Canadian Ice Foundation's Fall and Winter programs, and information on dates and media will be released soon.

A continuous advertising program in the Canadian Grocer, national retail food store magazine, is promoting iced displays this summer for produce, meat, fish and poultry. The June 15 issue of this publication, which is read by 7,573 food store operators from coast to coast carried a striking advertisement headed "Double Your Produce Business. You Can Do It With Iced Displays."

First advertisements carried photograph of a modern 16-foot iced vegetable display case, stocked and iced, and copy said in part, "Produce business booms in the stores with iced displays because women know that vegetables displayed and protected with ice gives them more for their money in freshness and flavor."

The July 15 issue carried a similar advertisement featuring iced displays for all types of fresh foods—vegetables, meats, fish, poultry; and the August 15 issue will feature meat-on-ice exclusively. Retail food dealers are asked to contact local ice companies for information regarding iced vegetable displays, etc., and modern crushed ice service.

Ice Exhibit at Super Market Convention



A top attraction for the 18,000 visitors who attended the 1952 Super Market Institute convention May 11-15 in Cleveland was the ice exhibit set up by produce consultant A. M. "Andy" Andrich. An iced vegetable display, poultry on ice, and a popular "snack bar" of cut-up vegetables were the main features. Trusty Manufacturers participated, furnishing the 10-foot Super Market produce case.

Practical Refrigerating Engineer

NATIONAL ASSOCIATION PRACTICAL REFRIGERATING ENGINEERS

Howard Peterson, Yakima, Wash.
Chairman Membership Committee, National Association Practical Refrigerating Engineers

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Trained Workers Help Reduce Refrigeration Plant Accidents

J. F. MARTIN
Assistant Chief Engineer
Hartford Steam Boiler Inspection and Insurance Company

This article, based on a study of refrigerating system accidents deals with accidents that arise from circumstances apart from the construction and physical condition of the various pipes, coils and vessels that go to make up a refrigerating system.

A TRAINING program for general employees is a management problem. The operating engineer and the visiting safety engineer can check the system itself to guard it against accidents caused by corrosion, failure of controls and faulty safety devices. They can also recommend guard rails or other protection for lines exposed to damage in the normal processes of handling goods. But caution and careful handling by storage room workers is up to management and supervisors. Their efforts to train the men can be the most effective factor in reducing refrigerating accidents caused by outside forces.

Safety engineering in the boiler and pressure vessel field is concerned with the causes and prevention of accidents to a great variety of plant equipment. Attention is given to the operating hazards of boilers, piping, tanks and a long list of vessels used to store, process, or obtain work from gases or liquids under pressure or vacuum.

Accidents Classified

Accidents to such equipment can be classified, in a general way, as follows: (1) those caused by errors in operation or maintenance. (2) those caused by errors in design or installation, and (3) those caused by outside forces or incidents not directly connected with the physical condition of the vessel or its related parts.

Among pressure containers, the refrigerating system probably suffers the greatest number of serious accidents in the third classification — those caused by outside forces.

In a survey of 200 refrigerating system accidents, made several years ago, it was found that 11 percent were due to outside forces. In a study of 259 more recent cases, 8.5 percent were so caused.

Both surveys dealt with accidents to the pipes, coils and vessels that make up a compression-type refrigerating system, but did not include accidents to compressors, pumps or other machinery components. (Generally speaking, the machinery parts of refrigerating systems are subject to different hazards than the pressure containing parts, and are usually treated separately in making an accident survey for insurance purposes.)

Accident Causes

Rough handling and carelessness account for most refrigerating system accidents in the "outside force" class. Packing cases are dropped on cooling coils; hand trucks are slammed into refrigerant piping; coils are struck with heavy defrosting tools; transport trucks—refrigerated from stationary systems—are driven away before they are disconnected. Such rough treatment breaks pipes and pulls down coils. The losses that follow usually go far beyond the cost of the damage to the system itself.

Accident Costs

The cost of the initial damage—a broken pipe or fitting—is often negligible. But the cost of the refriger-

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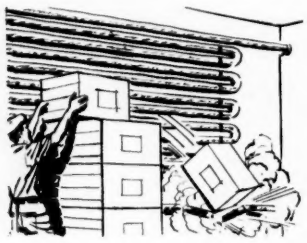
ant that is lost can be a sizeable item —especially if the break occurs at a point that cannot be quickly isolated from the rest of the system.



Another expense, sometimes incurred, is heat-spoilage of goods in cold storage. If the damaged pipe or coil cannot be readily repaired, or if a large quantity of refrigerant is lost, the system or a section of it may have to be shut down. Then, goods in storage may spoil from lack of refrigeration.

But the largest losses resulting from broken pipes and coils usually involve contamination. When the break occurs in a storage room, as so often happens, food products or other goods are likely to be tainted or discolored by the fumes of escaping refrigerant. Frequently the entire contents of one or more rooms are contaminated beyond any possibility or salvage.

Small Break—Large Loss

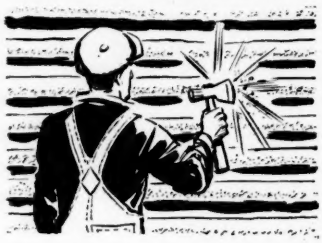
A recent accident at a dairy products plant can be used as an illustration to show how a minor failure of a refrigerant pipe can cause a serious contamination loss. A 16 lb. carton fell and broke a $\frac{3}{8}$ in. oil drain line at the bottom of a cooling coil. Before the break was discovered, 175 lbs. of ammonia had drained out of the coil and had filled the room with fumes. Practically all of the food stored there was contaminated. Although it cost only $15 to repair the broken pipe line, food products valude at $18,000 had to be dumped.

Losses of that kind emphasize the importance of extra safeguards and caution around refrigerant piping.

Two Major Hazards

The most important step toward preventing accidents caused by external forces is to protect pipes and fittings against damage by falling packing cases, or by carelessness with hand trucks. In our surveys it was found that two out of every three accidents in the "outside force" class stemmed from one or the other of these two causes.

Protection against such accidents requires that certain sections of piping or coils be provided with guard rails. But in order to determine which sections need protection, stacking and handling procedures must be studied. Even then, some danger points are likely to be overlooked. For example



a guard rail had been installed around an ammonia drip line at a cold storage warehouse. The guard was designed to protect the line from being struck by two-wheeled hand trucks used for moving goods in the warehouse. It served the purpose well for a time, but the drip line was finally broken when it was struck by an empty truck. Then is was discovered that the guard had been properly placed to provide protection against loaded trucks, but the cradle of an empty truck could slip underneath the rail and strike the pipe.

It may not be possible to provide complete protection against accidents caused by hand trucks and falling packing cases, but the number of such accidents can be materially reduced by guards properly placed around obviously exposed portions of pipe and coils.

Defrosting—Strong Arm Method

In another type of accident, cooling coils are broken when frost is being chopped or knocked off the coils. Scrapers, hammers, or even hatchets, are sometimes used to remove the frost quickly in order to avoid the delay of normal procedures whereby the frost is melted off in one manner or another according to the method planned by the manufacturer of the system.

The risk of damage is particularly high if defrosting has been put off too long. The weight of a thick coating of frost, or ice, plus the heavy blows needed to dislodge it, may be more than the coil or its supports can stand; or a large piece of ice, knocked off the upper portion of a coil may fall and break a pipe in the lower section.

Accidents that result from removing frost by hammering and chopping are almost always followed by a contamination loss. The accident usually happens in a room where goods are stored, and if the goods are of a kind that can be damaged by refrigerant fumes, a contamination loss is a practical certainty.

Five Inches of Frost

An expensive accident at a large warehouse was caused by mechanical defrosting. Ice, four or five inches

thick had accumulated on the cooling coils in a room where vegetables were stored. Using ice choppers of the sidewalk-cleaning variety, two workmen chopped at the ice on a one inch pipe, 16 ft. long. The pipe was in good, sound condition, but the heavy blows and the weight of the ice put it under too much strain and it broke.

Despite the fact that the coil was shut off and salvage operations were started as soon as possible, 400 lbs. of ammonia flowed out of the broken line and hampered salvage work. Vegetables valued at $8,000 were lost.

It is understood that the frost was being chopped off, rather than being removed by the slower melting procedure, because of heavy demands for storage space. From the safety engineer's point of view, normal defrosting methods, as intended by the manufacturer of the system, are the only safe methods. But if mechanical means are to be employed, only light tools should be used, and the operation should be closely supervised.

Safety Training

Supervision and education of all employees who work around a refrigerating system can go a long way toward eliminating accidents from outside causes. After such an accident has happened it is sometimes found that the employee responsible for it did not realize that the pipe he broke contained refrigerant. If he had been taught, through a training program, to recognize the refrigerant pipes, and had he been told of the serious damage that follows their breakage, the accident might not have happened.

NAPRE Question Box

H. G. Venemann, Professor of Refrigeration, Purdue University and chairman of NAPRE Educational Committee, answers members operating problems monthly in this column. Send questions to Chairman H. G. Venemann c/o Purdue University, West Lafayette, Indiana.

Ice Capacity Cut. Why?

Question No. 925: We have always been able to turn out 20 tons of ice daily until this summer. Now we cannot make more than 8 tons. Last winter we added a freezer room for our customers but this did not take more than three ton refrigeration capacity. We have one 8 x 8 compressor at 260 rpm and one 6 x 6 at 250 rpm. Before we added the freezer room we operated at 20 lbs. suction pressure and 160 lbs. discharge. Now we operate at 5 lbs. suction and 150 lbs. discharge, but we cannot make enough ice. Would you please explain why?—A.R.L.

ANSWER: At 20 lbs. gage pressure the ammonia temperature in the coils is 5.5 F. This is warmer than the freezer room temperature, so in order to reduce the ammonia temperature to a point where the freezer temperature is satisfactory you found it necessary to reduce the suction pressure to 5 lbs. This corresponds to an ammonia temperature of minus 17.2 F and gives you a room temperature of about zero degrees. Do you remember how you reduced the pressure to 5 lbs.? You did it by cutting down on the expansion valves that supply liquid to the ice tank and ice storage room coils, thus reducing the amount required to make the 20 tons of ice. When cutting down from 20 lbs. pressure to 5 lbs. pressure there is a considerable reduction in the amount of ammonia pumped. At 20 lbs. pressure your two compressors will pump about 16 lbs. of ammonia gas per minute, while at 5 lbs. pressure they will pump only about 8.5 pounds per minute.

Every ton of ice made requires about .72 lbs. per minute and every ton of refrigeration requires about .43 lbs. per minute. So figure it out for yourself. Your ice storage and freezer room require about 6 tons refrigeration capacity, and use 2.58 lbs. per minute of ammonia. At 5 lbs. pressure this leaves only 5.92 lbs. per minute for ice making, which is enough for only 8.2 tons of ice per day.

Do you know why your two compressors will pump only 8.5 lbs. per minute of gas at 5 lbs. pressure as compared with 16 lbs. per minute at 20 lb. pressure? It is because the space occupied by the gas increases as the pressure is lowered, while the displacement of the two compressors, 170 cubic feet per minute, does not change. For example: At 20 psig each pound of gas entering the cylinder occupies about 8.1 cubic feet, while at 5 psig it occupies about 14.0 cubic feet.

If the two compressors had a volumetric efficiency of 100 per cent they would be able to pump 21 lbs. per minute at 20 psig and 12.1 lbs. per minute at 5 psig. Since they are able to pump only 16 lbs. per minute at 20 psig and 8.5 lbs. per minute at 5 psig the volumetric efficiencies at these two pressures are 76.2 percent and 70.2 percent respectively.

A small compressor having a displacement of 26 cubic feet per minute, if piped directly to your freezer coils and independent of all other coils, would take care of this room and would enable you to go back to the full production of 20 tons of ice per day. This would take a 2 cylinder 4 x 4 at 450 r.p.m. or a 4½ x 4½ at 315 r.p.m. with 7½ horsepower motor.

It is very bad practice to operate freezer room coils on the same suction line with ice tank or ice storage room coils. It always reduces the refrigeration capacity of the compressors.—H. G. Venemann.

Warmer Brine With Colder Ammonia! A Paradox?

Question No. 926: There are two thermometers in the liquid line leading to our brine cooler. One is located ahead of the expansion valve and the cooler. I notice that when the temperature of the ammonia after the expansion valve is -20 degrees that I do not get the brine as cold as when the ammonia temperature is up around zero. It seems to me the colder I get the ammonia the colder the brine should be, but it works just the other way. There is something screwy about this. Another thing, the temperature before the expansion valve does not seem to have anything to do with the brine temperature. What good is it in the line?—M.N.L.

ANSWER: No, there is nothing screwy about your situation. If your brine cooler were being operated at full capacity with -20 degree ammonia, the brine temperature would be considerably colder than when the ammonia evaporating temperature is zero. Evidently you are operating it at only partial capacity by lowering the level of the liquid ammonia in the shell, thus leaving some of the brine tubes "high and dry." This cuts down the effective tube surface through which the heat is transferred from the brine to the liquid ammonia. Naturally, if you operate the cooler at partial capacity, you may expect the brine temperature to rise gradually.

An ammonia temperature of -20 degrees corresponds to a pressure of 3.6 psig, while a temperature of 0 degrees corresponds to a pressure of 15.7 psig. Let us assume that the cooler has a maximum capacity of 40 ton when operating at 15.7 psig with entering brine temperature 16 F. and leaving brine temperature 11 F. This would require the evaporation of 17 lbs. per minute of ammonia liquid with all of the tubes submerged. If the same compressor or compressors are to operate on this brine cooler at 3.6 psig they will not pump more than 9.8 lbs. per minute of ammonia. This reduces the cooler capacity from 40 tons to 23.1 tons, and the effective surface of the tubes will have to be reduced by lowering the liquid level of the ammonia. Under these conditions the brine will be cooled only 2.88 degrees instead of 5. But when this brine goes out into the rooms it is heated 5 degrees. Since it is heated 5 degrees and cooled only 2.88 degrees the brine temperature gradually rises and likewise the temperature of all the rooms. So the thing to do is to keep the ammonia level in the brine cooler above the tubs if you require full capacity and lower it as the brine load decreases.—H. G. Venemann.

Temperature of Liquid Before Expansion Valve

Question No. 927: In question 926 M.N.L. asks what good is the temperature of the liquid before the expansion valve. This question deserves a separate answer.—M.N.L.

ANSWER: The temperature of the liquid before the expansion valve does not have much effect on the brine temperature. It is a useful tool in checking the head pressure, which has much to do with power bill. Naturally a good engineer wants to keep the power cost as low as possible. Well, one way of doing it is to keep the head pressure at a minimum consistent with the economical use of condensing water. If air or foul gases get into the system the power cost goes up because the head pressure becomes excessive. The compressor must pump against the total head created by the ammonia gas in the

condenser and the foul gases in the condenser and receiver. By purging off the foul gases the total head will consist only of that caused by the ammonia gas. The temperature of the liquid will indicate the ammonia pressure exactly if it is saturated liquid, and within a few pounds if it is subcooled liquid.

Example 1: The temperature of the liquid is 88 F. Discharge pressure gage reads 200 lbs. What does this signify?

Answer: From the ammonia tables we find that the gage pressure should read 160 lbs. provided that the liquid is saturated. This signifies either that the gage reads 40 lbs. too high or that there is 40 lbs. of excess pressure caused by air or gases other than ammonia. If the liquid at 88 F. is sub-cooled 5 degrees its saturation temperature would be 93 F. and the gage pressure should read 175 lbs. The operator has no way of telling whether the liquid is saturated or sub-cooled unless a second thermometer is located in the saturated zone of the condenser or until all of the foreign gases have been purged, in which case the saturated temperature will correspond to the ammonia gas pressure.

Example 2: The temperature of the liquid is 88 F. Discharge pressure gage reads 150 lbs. What does this signify?

Answer: Since the minimum ammonia pressure should read 160.1 lbs. it is quite evident that the gage is reading incorrectly in which case it should be disconnected, tested and adjusted before putting it back into service.

From the two examples one can see that the liquid temperature, if properly understood, may become very important in the economical operation of the plant. Under ordinary circumstances a 5 pound reduction in head pressure effects a two per cent saving in power consumption. H. G. Venemann.

New Questions

Thawing Water Line

Question No. 928. A 2-inch water line which runs diagonally under a corner of our ice storage room froze for the first time in over 20 years. The water had been shut off for about 10 hours. I have run a temporary line. Is there any way I can thaw it out without digging up the floor? — R. L. C.

Engine Horse Power

Question No. 929. How can I figure the horsepower of the Corliss engine which drives my compressor. It is a horizontal double acting engine, 15 inch bore and 18 inch strokes speed, 120 rpm. The ammonia compressor is also horizontal, 10½ x 18. The engine and compressor are direct connected. Suction pressure 20 psig, head pressure, 185 psig.—A. F. G.

Heat Content, Total Heat,

Question No. 930. I have been studying psychrometric charts. One of them uses the term *Heat Content*, another uses *Total Heat*, a third uses *Enthalpy*, and a fourth uses Sigma Heat. Do they all mean the same thing? If not, will you please explain the difference between them? — M. E. W.

News Notes and Chapter Activities

Los Angeles

FRED HERR

LOS ANGELES Chapter of the NAPRE held an Old Timers' Night on June 18 in the Terminal Club as the final gathering on its 1952 first half schedule. There was no "business" on the program at all, as Ed L. Nelson, chairman of the entertainment committee, had been given a free hand to prepare an outstanding entertainment program.

The evening's activities were divided into a social hour from 6 to 7 p. m.; dinner from 7 to 7:30, golf tournament awards, introduction of old timers, and floor show.

One hundred and thirty three members and guests were present when President Edgar M. Marrs gave the signal to start eating and no second invitations were required when the aroma of the delicious Swiss steak floated through the atmosphere. After the dinner, E. T. Quinn took charge of a thirty minute period of fund raising during which the sum of $136 was produced for the chapter's general fund.

Herbert N. Royden of the Royden Ice Company, himself a 26-year NAPRE member and two-time chapter president (1928-29), then took over as master-of-ceremonies to introduce the old timers.

First to be introduced was J. Wesley Lamphier, a chapter member who joined at Los Angeles in 1922, and now is retired after many years of service with Terminal Refrigeration Company. Second oldest in point of membership was Walter W. Perry of the California Consumers Corporation, who joined in 1923. Getting a nice hand was H. G. Mansfield, Union Ice Company, who has held membership since 1924. The class of 1925 was well represented. It included Mr. Royden, W. R. Burnett, chief engineer of the Royden Ice Company, Frank Elliott of Union Ice Company, Howard R. Murray of Terminal Refrigeration Company, and E. R. Quinn of Pacific Fruit Express.

Others introduced were Furman T. O'Hara of Lockheed Aircraft Co., Frank Cooper and William H. Brittin, who joined up in 1926; Earl Z. Ratley (1927); Loren H. Anderson, Donald Byl and Ed L. Nelson (1928); Rudi Kettler and R. L. Maple (1931); John Anthony (1932); W. H. Waters (1935) and Ralph E. Hitchcock (1937).

Mr. Royden briefly reviewed the history of the chapter. He recalled that when he attended his first meeting in 1925, there were only five members present and the chapter had neither a program of objectives nor one in preparation. The NAPRE has come a long way was since 1925, Mr. Royden said. He cited the efficient machinery Los Angeles Chapter now has functioning in the form of a successful preliminary class and general sessions technical programs. He lauded the men who through the years have carried on so well in instructing embryo refrigeration engineers, the late and beloved Jesse Blair, Ed L. Nelson, Elmer Johnson, George Palick and Jack Snyder. He also referred to the tremendous strides in chapter membership that have been attained, principally during the past five years under the dynamic leadership of W. R. Burnett, when four national membership pennants were won to make Los Angeles the largest chapter in the NAPRE.

At the conclusion of the old timers' program, President Marrs requested Frank Eccleston, V. A. Stubblefield and Jack Johnson to step to the fore. These were the three winners of top places in the May 25 NAPRE golf tournament at the Montebello Municipal Course. Eccleston became the proud recipient of the Quinn Trophy for turning in low gross score; and other trophies went to Stubblefield and Johnson for second low scores, and low net, respectively.

The proceedings then were delivered into the hands of Mr. Nelson and his entertainment committee. Mr. Nelson again produced a top-flight show and a program of varied acts that was thoroughly enjoyed by all. Included were three comedy films of circa 1910 — *Belles of Burlesque*, *Hitchhiker*, and *Fanny at the Beach*. A floor show of well selected dance, song and musical numbers rounded out the program.

Los Angeles Chapter will hold no meetings during July and August. Chapter activity will be confined to efforts by W. R. Burnett to keep the membership on its toes on new memberships in order not to let the spark of the campaign sink too low during the no-meeting months.

Opening event on the forthcoming fall program will be the Ham-and-Beans Dinner on September 3.

Golf Tournament

Frank Eccleston of the California Consumers Corporation, Los Angeles, for the second consecutive year became the winner of Los Angeles NAPRE Chapter's annual golf tournament when he turned in a card with a net of 87 at the 1952 playing of the event over the Montebello Municipal

Golf Course in Montebello, Calif., Sunday, May, 25.

Frank, a long driver from the tee, better-than-average with his irons on the fairway, and a deadly putter, topped a field of 24 chapter members and guests with a score which was only a few strokes above the total which won for him over the same course in 1951. He was declared winner with low gross of 87 (handicap 12) for low net of 75, which earned for him the E. T. Quinn Trophy.

Members of Los Angeles Chapter, NAPRE, and guests, who participated in the chapter's second annual golf tournament at the Montebello Golf Course, Montebello, Calif., Sunday May 25. Pictured just before the tee-off of the 18-hole handicap play, are, Front Row: Frank Muzzy, Frank Elliot, Ray Elliot, George Swanson, Herbert N. Royden, Herbert Gannon and Jack P. Johnson, the low net winner. Second Row: R. M. Maple, R. L. Maple, unidentified, Rudi Kettler (in black outfit), Ed Pace, Ed Elliot, Frank Eccleston (in rainbow sport shirt, first prize winner), J. Moore, V. A. Stubblefield (he won second prize), unidentified, Ben Taylor, E. G. Barrio, William E. Losch, G. J. Mai, Frank Tucker, William Osborn and John Beach.

V. A. Stubblefield of the Pacific Fruit Express shot 94 which with a 22 handicap, gave him a net of 72, and second prize, also a cup.

Jack Johnson of the All-Lube Corporation came home with a total of 96, which his 26 handicap brought down to 70, for low net prize, a fine trophy cup.

The tournament produced no holes-in-one, although two birdies were chalked up. Eccleston shot a birdie on the 540 yard par 4 No. 5 hole, and J. K. Moore also came through with a birdie on the 476 yard, par 5, 18th hole.

Twenty of the players assembled at the home of Frank Eccleston in Montebello after the conclusion of the tournament for a collation and buffet lunch and general discussion about what happened out on the fairways. Not one word of refrigeration was mentioned, as golf talk filled the atmosphere in Eccleston's pleasant living room and kitchen.

Almost unanimous was the conclusion that ". . . something will have to be done about this fellow Eccleston," to keep him from being the perennial winner, no doubt. As a matter of fact, Frank will have to shift a goodly array of golf trophies about on his shelf to accommodate the two NAPRE cups which he won in 1951 and this year.

The cups were presented to the three winners at the chapter's Old Timers' Night meeting at the Los Angeles Terminal Club on June 25.

The golf tournament has become extremely popular with the chapter members, Chairman Eccleston reported to ICE & REFRIGERATION, and will undoubtedly be one of the feature events on the chapter's sports program every year hereafter.

The field of players this year included the following: Jack P. Johnson, Herb Gannon, H. N. Royden, George Swanson, Ray Elliot, Frank Elliott, Frank Muzzy, John Beach, William Osborn, Frank Tucker, G. J. Mai, William Losch, E. G. Barrio, Ben Taylor, V. A. Stubblefield, J. Moore, Frank Eccleston, Ed Elliot, Ed Pace, R. M. Maple, R. L. Maple, John Bene, M. J. Mulder and C. Thornton.

The group photograph which illustrated this report was the result of the expert camera technique of George Paulick of the California Consumers' Corporation. Rudi Kettler and Frank Eccleston composed the handicapping committee.

Colton

H. O. BONTER

THE first June meeting of the Colton Chapter was held at the Santa Fe Ice plant in San Bernardino. Guest speaker for the evening was Jack P. Johnson of the Allube Corp., Glendale. Mr. Johnson gave a very thorough talk with illustrations on the blackboard of the different grades and qualities of lubricating oils and greases. He explained the different uses for the various types. He showed how each type of oil and grease is made for each particular job and demonstrated the results if the wrong kind is used. Samples of various types of oil were on display for inspection by the attendants.

Carl L. Hooker, Utilities Engineer for the Exchange Orange Products Co., Ontario was welcomed to membership.

The usual prize drawing took place which was followed by a lunch.

The July 9 meeting was a very interesting one. After the group enjoyed a ham dinner a very interesting talk was given by Gilbert Powers of Powers Refrigeration (Carrier) Los Angeles. Gil substituted for his father, Felix Powers, who was unable to attend the meeting.

Mr. Powers' subject was the one thousand acre ranch of Stoddard Jess in apple valley east of Victorville, Calif. Mr. Jess processes 80,000 turkeys a year for the market. He raises and processes his own food for the turkeys. He also has 400 Herford cattle on the ranch and has gone very extensively into the raising of trout in several large reservoirs. The wells produce 12,000 gallons of water per minute, 24 hours a day. The 57 degree water is pumped over cooling towers to pick up oxygen for the fish in the reservoirs. A hundred thousand pounds of meat per month is fed to the fish besides mash and other food and vitamins. On this diet the trout grow one inch per month.

Memphis

CHARLES CONLEY

AT the second June meeting the members had a round table discussion and general social meeting. The weather has been unusually hot and all of the plants have been running to full capacity. Air conditioning equipment is at a premium and the service companies and men have all they can do.

Mr. Todd, the chapter's instructor was out of town so the educational portion of the evening on the King Course was postponed.

L. D. Mullins, assistant engineer for B. Lowenstein's was elected to membership. Mr. Mullins has just returned to the states after having served about two years with the U. S. Army Engineers in Korea. He has resumed his usual job with Lowenstein.

At the meeting on July 2 Mr. Todd resumed instruction on the Refrigeration Course. The various types of condensers were covered. Mr. Todd sketched his subject on the blackboard in order to explain the operation of the various types of condensers. The coverage was very thorough and there was good attendance in spite of the very hot weather.

We regret to report the death of Edd L. Eaker. Mr. Eaker was assistant to the chief engineer at the Humko Co., at the time of his death. He was very faithful in his attendance at the meetings and there were very few he missed. He will be greatly missed. Mr. Eaker is survived by his wife, Florance and daughter Catherine, both of Memphis; and his mother, Mrs. J. W. Cole of Charleston, Miss.

Seattle

JAMES R. BENNETT

SEATTLE Chapter regrets to report the death of James R. Cummings, one of its charter members. Mr. Cummings, a stationary engineer had lived in Seattle since 1906. He was born in Fayetteville, Tenn. Surviving are his wife, Edith and two brothers, C. M. Cummings, Seattle and William M. Cummings, Holtville, Calif.

Small Probe Measures Thermal Conductivity

A SMALL thermal conductivity probe can be used for measuring thermal conductivity of insulating materials and can obtain results equal in reproducibility to the best obtainable with the guarded hot plate, the American Society of Heating and Ventilating Engineers heard at its semi-annual meeting held at Spring Lake, N. J.

The development of an electrically heated probe four inches long and .03 of an inch in diameter which, when modified, could be used for absolute measurements, was reported by D. D'Eustachio, physicist, and R. E. Schreiner, technician, both with Pittsburgh Corning Corporation, Port Allegany, Pa.

"In its present form, with stainless steel tubing as a protective sheath, it is difficult to use the instrument for absolute determinations. However it appears practicable to further reduce the diameter and heat capacity by discarding the metal tube. With this change absolute calibration to better than one percent should be possible," they said.

Tests Show Results

Tests on cellular glass have shown good agreement with the guarded hot plate results and excellent reproducibility for a range of power outputs, the Pittsburgh Corning men said. "The results indicate that any reasonable clearance between the probe and the insulation has little effect on the thermal conductivity determination," they reported.

Manufacturers and users of insulation have for a long time needed a fast method for measuring thermal conductivity, a method which would have the precision of the guarded hot plate method while avoiding most of its problems, the authors declared in their paper.

Steady state methods are handicapped by the time required to attain a satisfactory equilibrium for accurate measurement particularly when testing poor conductors. In addition, all the steady state procedures need careful instrumentation and adjustment to insure proper balance between the guard and test areas, and this means large and expensive installations requiring considerable skill to maintain and operate, it was declared.

In comparison to steady state methods, transient heat methods have therefore always appeared attractive.

Description of Probe

"The basic criterion used in the design of the new instrument was that the temperature change in the material whose conductivity was being measured should be as small as possible," the authors explained. "A number of experimental models were built following the general construction described by F. C. Hooper and F. R. Lepper in a previous ASHVE paper.

"It soon became clear that significant reduction in diameter was necessary if small temperature changes were to be used, and that changes in design were needed to attain the required reduction in size. It was necessary to keep the electrical resistance of the heater high and at the same time make the overall length of the heater short.

"This was accomplished by using a bifilar spiral wound of two mil constantan wire for the heating element. The clearance between the stainless steel housing and the spiral was made as small as possible. Care was taken to insure uniform spacing in the winding. Thermocouples, connected in series, were placed inside the coil.

Construction of Probe

"The actual steps in the construction of the probe were as follows: First, the bifilar coil was wound on a small diameter aluminum tube. A polyamide filament was used as a spacer. After completing the winding the spacer was removed and the coil was bound together with a thermosetting plastic.

"Then, the aluminum tube was removed by dissolving it with dilute acid. Next, insulated one mil copper constantan thermocouples were placed inside the coil. The heater and thermocouple assembly was then placed inside the stainless steel housing and was vacuum-impregnated with a coldsetting plastic. Finally, a plastic knob was cast at one end to act as support for the leads.

"The need for accurate measurement of a small temperature change as a function of time precluded the use of a manually operated potentiometer. Instead, a simple recording system was used. It consisted of a high-sensitivity galvanometer having a period of 1.3 seconds and means for recording galvanometer deflections directly on photographic paper mounted on a rotating drum.

"The optical arrangement was fairly conventional. The photographic paper used had a specially treated base to prevent dimensional change during processing. With this arrangement it was possible to measure temperature changes of .01 F degrees."

Modification of Probe

The authors said they were not confident the probe in its present form could be used for absolute measurements because there is no simple way of evaluating the effect of the non-radial heat flow. Improvement can be made by reducing the diameter and heat capacity and possibly increasing the length.

"The major problem in building such a probe is to obtain sufficient strength and durability to make the device a practical test instrument," they said. "There are indications that a fiberglass sleeve, impregnated with a suitable plastic, can be substituted for the metal housing without appreciable loss in strength.

"Such an instrument will have one-eighth of the axial conduction of the metal sheath probe and less than one-half of its heat capacity per unit length. It is not difficult to decrease its diameter to less than .02 of an inch. With these changes it will be feasible to use lower power inputs, lower temperature gradients in the insulation, and shorter time periods, without sacrificing precision.

"With these modifications the departure of the performance from the theoretical ideal should be so small that it could easily be calibrated on an absolute basis."

Fact Finding Conference

THE Institute of American Poultry Industries will hold its 24th annual Fact Finding Conference in the Kansas City Municipal Auditorium February 14, 15, 16 and 17, 1953, Cliff D. Carpenter, Institute president, has announced.

"With four days instead of the usual three," said Mr. Carpenter, "people should have a better chance to take in more of the program clinics, spend more time in the exhibits, and make more individual business contacts. Particularly since we plan to open only the exhibits and registration the first day."

The program clinics, starting the second day, will be shortened somewhat too, he added, and there will be fewer speakers, to allow more time for floor discussion. In addition, all "side" meetings will be held by allied groups will be scheduled for Saturday, the first day, to avoid conflict with the conference program.

Refrigerated Warehousing Industry

NATIONAL ASSOCIATION of REFRIGERATED WAREHOUSES

Division of American Warehousemen's Association

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THIS MONTH IN BRIEF

A new freezer storage plant has been completed by the Arizona Ice & Cold Storage Company at Tucson, Arizona for storage of frozen foods.

The Southwestern Chapter NARW has organized a plan to keep storage customers informed as to the freezer space available in refrigerated warehouses in that section.

A new underground refrigerated storage, with 1,400,000 cubic feet of cooler and freezer space has been opened at Coldspur, Kansas, 17 miles west of Kansas City.

A new idea in refrigerated storage construction is to construct walls in such a way as to permit easy expansion when additional space is needed.

Utilization of public cooler space during June increased to 63 percent while freezer occupancy remained unchanged at 77 percent. June gains in storage holdings were reported for a number of commodities.

Freezer Storage in Arizona Will Serve Frozen Foods and Shrimp Industries

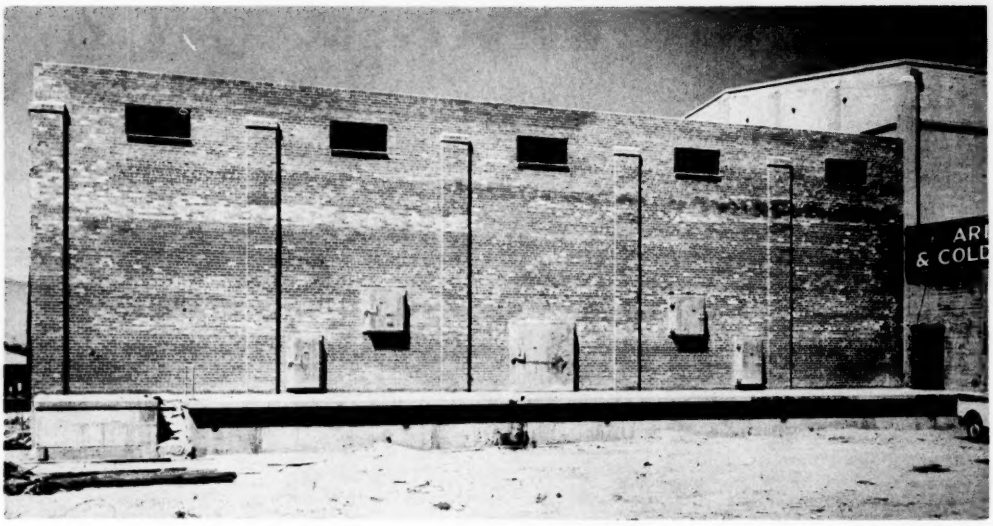
Interior of new storage room Arizona Ice & Cold Storage Company. Note overhead ducts for air circulation.

A NEW freezer storage building has been completed by The Arizona Ice & Cold Storage Company, Tucson, Arizona, with capacity to take care of 30 to 35 carloads of frozen merchandise. Cost of the new building and equipment was approximately $125,000. Principal business is expected to come from frozen food processors and west coast shrimp processors. An in-transit rate has been established on shrimp from the west coast of Mexico to California and eastern points, which will enable processors to store in the new warehouse and later ship to the East.

The building is of brick construction, insulated with Palco Wool and four inches of corkboard around the base of the entire building. There is a spur in the rear of the building to take care of carload shipments and a fifteen-foot platform all the way across the front of the building provides for receiving goods that come by truck. It is a completely palletized operation, with a Crescent pallet truck to be used on both railroad and truck dock. There is an anteroom ten feet wide across the front, which will be used as a break-down and marking room. All equipment and insulation is designed to hold the storage room at a temperature of 0 F or under.

Refrigeration

Refrigeration is supplied by a 7 x 7 Frick ammonia compressor connected by V-belt to a 50 hp motor, with standby unit of 7½ x 7½ Vilter ammonia compressor V-belted to a 35 hp. motor. Circulation is provided



Front view of new freezer storage of Arizona Ice & Cold Storage Company, Phoenix, Ariz. Note truck platform extending across front of building.

by two King sharp-freeze blower units, each with capacity of ten tons of refrigeration, each driven by 10 hp Century two-speed motors.

The storage room is equipped with Jamison doors, 6 feet wide and 6 feet 6 inches high. The walls are of 12-inch brick, with 14 inches of Palco Wool. There is a 4-foot cinder fill under the floor, with a 4-inch concrete slab and a 6-inch tile pipe every 20 feet through the cinder fill for floor ventilation.

Magazine Article on N A R W Interviews

SELECTED as an outstanding example of effective trade association communications, interviews published by NARW were described in detail in the June issue of the Public Relations Journal.

The articles, written by Wm. Dalton, executive vice-president of the National Association of Refrigerated Warehouses, describes the subject matter of such interviews and the technique of developing the content.

Tax Amortization

A CERTIFICATE of necessity for accelerated tax amortization has been granted to the Quincy Market Cold Storage & Warehouse Co., Boston, Mass. Amount certified was $734,000 for public cold storage facilities, of which approximately 55 percent was allowed.

EDITORIAL

Why a Trade Association?

ON THE BASIS of what they do to protect the livelihood and promote the welfare of industry, America's trade associations have long since justified their existence. Refrigerated warehousemen in particular recognize the vital role which the trade association plays in their business affairs. In the National Association of Refrigerated Warehouses, they have a competently managed, professional organization which is providing high calibre leadership for a fast growing and extremely important industry.

Not the least beneficial effect of modern trade association activity is the public interest and sympathy which has been aroused in behalf of industry. It is now realized, too, that trade associations promote the public welfare by raising ethical standards for industry and by establishing uniform standards and practices which do away with waste and inefficiency of operation. The bulk of the resultant savings are passed along to the consumer.

Trade associations are in fact everybody's business. Especially do they have a right, we think, to claim the time and the talents of businessmen, whose welfare they essentially promote.

As a rallying point for management, the trade association has helped balance the power invested in today's Big Government and Big Labor.

NARW's parent organization, the American Warehousemen's Association, was founded in 1891. With the development of mechanical refrigeration, cold storage became an increasingly important warehouse specialty. Today NARW is a self-propelling unit operating within the AWA framework. It has a membership of nearly 500 companies, a number of them located in foreign lands.

Government regulation of and interference with private business which began with the New Deal and has continued through World War II and its Korean sequel caused a shift in emphasis in association activity. Government liaison became a topic of prime concern and as a result NARW has devoted considerable effort to the establishment of a smooth working relationship between refrigerated warehousemen and the government agencies charged with responsibility for warehousing industry operations.

No doubt a great share of the credit for the fact that we are no farther down the road to Socialism than we currently find ourselves (and that's far enough!) is due to the "quarterbacking" of industry's defense by American trade associations such as NARW.

On that score alone, they deserve a full dress salute and the undying gratitude of every citizen who believes in the philosophy of free competitive enterprise.

In addition to the lip service, however, trade associations also deserve the active and continuing support of all business—large and small alike. The nature and extent of the grass roots support which they get determines the degree of their effectiveness in fighting the industry's battles.

Southeastern Chapter Reports Space

IN A MOVE to combat the problem of scarcity of cold storage freezer space, the Southeastern Chapter of NARW has set up a weekly space reporting system among the 26 cold storage plants in the regional organization.

Explaining the necessity for such a move, Southeastern Chapter Chairman W. B. Haggerty pointed out that the southeastern United States is becoming a large producer of many frozen foods, such as fruits, vegetables, meat products, seafoods, poultry and concentrates. Eleven of these products, Mr. Haggerty says, are increasing rapidly in volume. Since they are all seasonable commodities, they fill the southeast freezers to capacity at the peak of harvest, leaving many processors disgruntled and unhappy as the result of a fruitless search for unoccupied space. The result is that some producers of concentrates have arranged to construct their own facilities.

New Freezer Space

Mr. Haggerty predicts not less than a million and a half cubic feet of freezer space will be completed this summer alone in the State of Florida. Naturally, this space cannot be sustained on two or three months of one hundred percent occupancy and a gradual shrinking toward zero occupancy prior to each new harvest. In order to offset their burden, the processors will feel compelled to offer their surplus space for storage to anyone who can use it and at any rates which will bring in some income.

To meet this problem, and to help solve customer storage problems the Southeastern Chapter has agreed to undertake a comprehensive reporting system on its own. A simple reporting form has been developed and distributed to the Chapter members. Friday of each week, the member companies are asked to mail the form to the Chapter Chairman, showing the quantity of both freezer and cooler product which each company estimates it can handle during the coming week.

The report is only an estimate subject to later confirmation. Upon receipt of the information, the Chairman's office compiles it and makes it available to industry customers in the market for refrigerated space.

Mr. Haggerty reports that the customers' initial reaction to the plan has been enthusiastic and the Chapter feels that a valuable step has been taken toward improvement of customer service and protection of the industry as a whole.

This plan is an outgrowth of discussion at a Southeastern Chapter meeting at the NARW Convention in New Orleans, May 4-8, reported in the June issue of ICE AND REFRIGERATION.

Warehousemen Protest Performance Bond

A LETTER setting forth objections to the requirement that warehousemen doing business with the Commodity Credit Corporation shall provide a performance bond has been forwarded by Wm. Dalton, executive vice-president of the National Association of Refrigerated Warehouses to Charles F. Brannan, Secretary of Agriculture. The provision requires that such a bond amounting to 20 percent of the assessed value of the commodity stored be purchased by the warehouseman.

In his letter Mr. Dalton enumerates the objections by refrigerated warehousemen to the performance bond as follows:

The financial soundness and operational reputation of the members of the warehousing industry can be easily and readily recognized through (a) the furnishing of a financial statement, (b) past performance for the corporation, (c) the usual investigation procedure employed by P M A regional office staff members.

The refrigerated warehousing industry operates under restrictions and limitations of the Office of Price Stabilization. Its rates are frozen at a level where many members are operating under a definite financial handicap. The spread existing as a result of this bond requirement cannot be offset by the warehousemen without considerable hardship to them—and then only through special permission of OPS. This could be possible only after considerable red tape, delay, investigation, and scrutiny by that agency.

There is considerable feeling among refrigerated warehousemen, many of them good friends of USDA's for many years—that the industry is being penalized for the mistakes that other industries having no direct relationship to refrigerated warehousing may have made in the past.

After these objections had been cited the Secretary is asked to lift the bond from the contract to which refrigerated warehousemen will have to affix their signatures. It is suggested that such a bond is unreasonable and inequitable, especially in view of the fact that many millions of dollars worth of perishable commodities are handled each year by these same refrigerated warehousemen for private storers. These storers do not require or request such a performance bond for the simple reason that their experience with these warehouses has been such that they deem them entirely trustworthy and reliable.

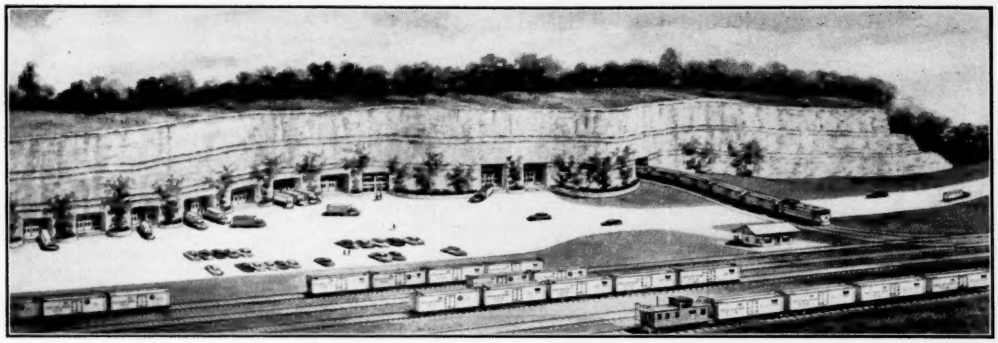
Under the circumstances, the letter concludes, this is not a "performance bond"; it is a "penalty bond" demanded by C C C because they apparently anticipate bad performance, skulduggery or dishonesty. In view of all these objections it is suggested that the whole question of a performance bond be re-evaluated and revised.

Storage of Spices

UNDER the arrangement for short term investigations at the Massachusetts Institute of Technology under auspices of the Refrigeration Research Foundation, Bernard E. Proctor and Ernest E. Lockhart have completed a study of the comparative effects of normal and refrigerated storage on the chemical composition of spices. In this work the research committee of the American Spice Trade Association also gave assistance.

Spices used were cinnamon, cloves, paprika, black pepper, red pepper and sage, chosen as representative and of economic importance. Temperatures were 0, 34, and 72 F. Quincy Market Cold Storage and Warehouse Company provided the refrigerated storage. Chemical measurements included total and volatile ether extract, volatile oil and its refractive index, and nitrogen and piperine content of black pepper.

Results indicate that extensive decomposition of red pepper pigment occurred at room temperature (RH less than 50 percent) during the storage period of nine and a half months, and was retarded at 34 F and almost eliminated at 0 F. A similar experience was observed with paprika, although the pigment in paprika was more stable than in red pepper. Changes in other chemical components were not observed. Drs. Proctor and Lockhart believe that studies on other spices should be made to determine whether, as in red pepper and paprika, refrigeration at low temperature would be advantageous.



Front view of new underground storage warehouse. Note parking space for trucks and railroad spur running directly into storage space.

Refrigerated Storage in Limestone Cave

A NEW underground refrigerated warehouse installed in a limestone cave has been opened for business by The Natural Storage Company, Inc. at Coldspur, Kansas, seventeen miles west of Kansas City. It is located on the tracks of the Union Pacific Railway. Organization of the company and installation plans were announced in July, 1951, ICE AND REFRIGERATION.

The warehouse lies under a 72-foot layer of limestone, which covers about 500 acres of land. The limestone has been excavated through an area of some 1,000,000 square feet, except for the columns which were left in place to support the roof. The space between the columns averages 40 feet.

The natural temperature within the limestone formation is approximately 55 F. The 50,000 square feet of area at the front is used for dry storage, as well as loading space. A double-track spur of the railroad extends into the mine, being depressed to form a "track well," so that the main floor of the warehouse is on the level of the car floors.

The floor of the former limestone quarry has been leveled and covered with a 4-inch slab of concrete, which will bear the heaviest loads. Ten outside openings at the base of the stone bluff provide easy access for railway cars, trucks and loading equipment.

Behind the dry space is an equal area divided into rooms and held with refrigerating equipment at temperatures of 32, 36 and 40 F. This area totals 800,000 cubic feet in volume. Still further inside the cave are 600,000 cubic feet of freezer space, held at minus 10 F.

This warehouse has its mailing address at Bonner Springs, Kansas, and its general offices at Kansas City. Guy E. Stanley, Jr., is president of the company. It is planned to increase the usable storage space from 2,400,000 cubic feet to 10,000,000.

It is also planned to add a quick-freezing tunnel, as well as ice-making facilities which will do the initial icing of refrigerated cars before they leave the underground cold storage.

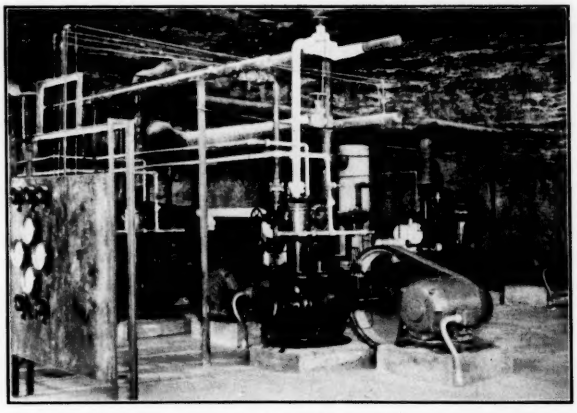
Refrigeration

The space is refrigerated with twenty-eight Frick unit air coolers, each of size 15003-BU. These are equipped with 5-hp fan motors, and have deflecting vanes on the outlet elbows. The units are fed with cold brine from insulated pipes, run close to the ceiling. There are two brine coolers, one 20 in. in diameter by 15 ft long, and the other 24 in. in diameter by 16 ft long.

The low-temperature work is handled by an 11½ by 8 Frick booster compressor discharging through a gas-and-liquid cooler into an 8 by 8 second-stage machine. This is connected in turn to a multipass condenser 20 in. diam. by 15 ft. long.

Another Frick 8 by 8 is connected to the 24 in. brine cooler, and discharges into a condenser of the same size as the first mentioned. A 10 by 10 has lately been ordered. The booster machine is driven by a 50 hp motor, while the 8 by 8's have 75 hp motors.

Float valve control is used in the brine coolers and on the gas-and-liquid cooler. Other control equipment includes thermostats, high- and low-pressure cutouts, purger, magnetic starters, and a delayed-timing relay. The compressor room is surrounded by thick stone walls.

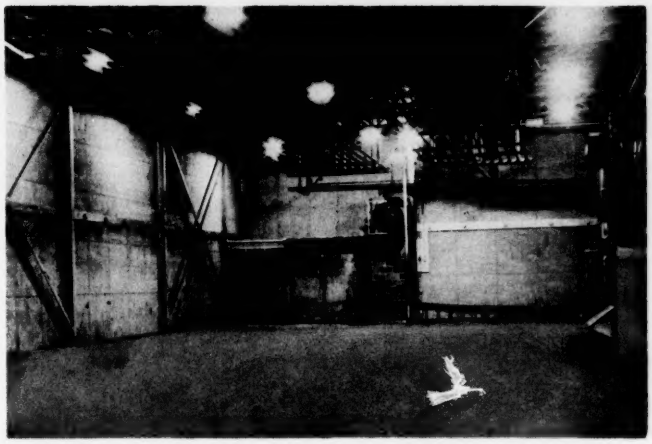


Two Frick 8 x 8 and an 11½ x 8 booster, part of refrigerating equipment of new underground storage.

New Cold Storage Construction is Expandable

WITH the demand for low-temperature storage increasing, most refrigerated warehouses are confronted with the need of a building program. Many are completing what is economically feasible now and holding the rest of the construction to a definite future schedule, according to The Armstrong Cork Co.

The Holly Cold Storage Fruit and Produce Company, Holly, New York is cited as an example. Enlarging their facilities, this company constructed a new holding room approximately 130 feet long by 43 feet wide and 22 feet high.



One exterior wall of this holding room was constructed of solid corkboard, properly weatherproofed. When future expansion occurs at this plant in Holly, New York, the corkboard wall will become a finished interior wall of the new warehouse addition.

Easy Expansion

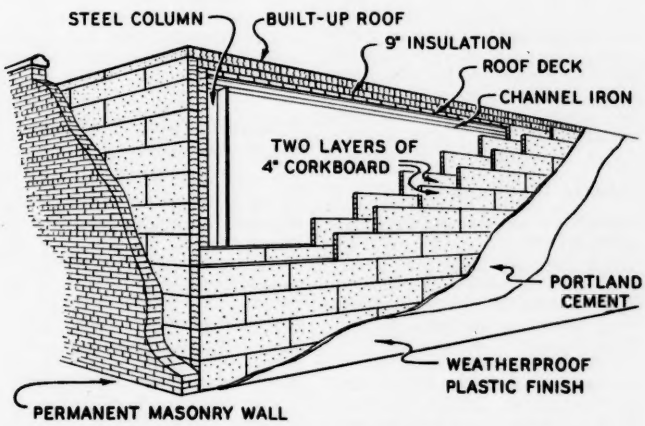
The unusual part about this construction is that new masonry building walls were constructed on only three sides of the room. The other wall of the new room, which faces in the direction of future expansion, is solid corkboard. This not only saves the original construction cost of one building wall but also permits easy expansion as future cold storage space is added. The solid corkboard wall is finished on both interior and exterior sides with two coats of portland cement plaster. Over the exterior portland cement plaster one coat of weatherproof plastic, trowelled to a thickness of ⅛ inches, provides temporary weather protection. The weatherproof plastic eliminates the need of building walls and protects the insulation from climatic changes.

When future expansion occurs, the solid insulation wall that is finished with weatherproof plastic will be an interior wall of the new holding room. If desired, the black appearance of weather-proof plastic can then be painted with an aluminum paint to create a more pleasing appearance on the interior of the room. In addition, when new facilities are added in the future, it will be relatively easy to cut through the solid corkboard wall to provide door openings for trucking aisles into the new structure.

Insulation, six inches thick, was erected on the walls and floor of the holding room. A total of 9 inches of insulation, erected in two layers, covers the roof area. Interior steel H columns adjacent to the corkboard insulation on twenty-foot centers support the ceiling trusses, tongue-and-groove pre-cast concrete decking and insulation.

Reinforcement

The exterior solid corkboard wall is reinforced both horizontally and vertically. Horizontally, steel reinforcemen was used due to unusual wall heights and carries the entire length of the wall for additional support. To insure uniform thickness of insulation around the steel reinforcement, additional corkboard was applied on both inside and outside wall surfaces. All insulation was applied by the mechanics of Armstrong's Contract Service.



This diagram shows construction details of walls in new holding room of Holly Cold Storage Fruit & Produce Company.

Moore Returns To Duty

WM. A. MOORE, secretary and general manager of the New Orleans Cold Storage & Warehouse Co., who has been off duty several weeks for treatment in a hospital, and attended by doctors and nurses, has returned to duty. Mr. Moore says he is glad to be back, and all of his business associates also welcome his return.

Prof. Wiegand Retires

AFTER 33 years directing the teaching and research activities of the department, Professor E. H. Wiegand, head of the Food Technology department at Oregon State College, Corvallis, retired June 20.

Since 1919 when he organized the first four year curriculum in schools of higher education to train students in food technology, Professor Wiegand has contributed to the growth of the food processing industry in the Pacific Northwest. Through the research work in the agricultural experiment station, he has developed many new processes and improved processes. Improved methods of handling fruits and vegetables, the cherry brining method which has developed an industry worth 22 million dollars annually, and the first mechanical recirculating drier for Northwest fruits have represented steps in the expansion of the industry.

His pioneer work in the frozen food industry and the introduction of other sweetening ingredients than sucrose in canning and freezing fruits have had an impact in the food processing world. Standardization of food products, research carried on in cooperation with such organizations as the Northwest Canners Association, the Northwest Frozen Food Association, and the National Association of Frozen Food Packers, has been intensive during his 33 years in the department.

He brought industry representatives to the campus in 1922 for the first annual short course in canning; in February, 1952, the 31st Canners' and Freezers' school was opened with the dedication of the new food technology building which stands as an answer to Professor Wiegand's dream. The annual short course serves as a continued tribute to the close association of the college with industry.

During World War I and prior to his coming to Oregon State, he worked for the United States Department of Agriculture, Bureau of Animal Industry, as a poultry production specialist in Kansas. He has continued to work with the USDA cooperatively on various projects, particularly with the Western Regional Research Laboratory in Albany, California.

Professor Wiegand leaves Oregon State with a "family" of graduate food technologists in nearly every state in the country and in many foreign countries. His name is known in the food processing field for his many publications and talks during his 33 years in the department. The food processing industry in the Northwest has had a loyal friend in Professor Wiegand, fondly called "Prof" by students and industry representatives alike.

He plans to serve as a consultant in food technology, and will continue to serve the food processing industry in this capacity. He can be reached at his home in Corvallis, 302 N. 29th.

Freezing Frankfurters New Business Idea

FROM Worcester, Mass., comes a new business idea for the cold storage and frozen food industry. Originated by John Jacobson the idea it to "overcome the overtime expenses normally involved when there is a sudden demand" for such items. John's own words follow: "We tested two cartons of these rolls containing 15 one dozen packages (sealed in wax paper) by freezing them on Thursday June 19 at a zero temperature, and withdrew them Monday, June 23. One package was allowed to defrost at the normal room temperature of 72 F within the sealed wax paper, and the other carton was allowed to defrost with the wax broken and exposed. In one hour and 15 minutes both packages were completely defrosted, and it would have been impossible to differentiate between those rolls which had been packed the previous night.

"Because of this experiment, the local bakery sent 1,000 cartons to be used for the 4th of July holiday weekend. As explained by the customer this method of freezing will save him many dollars in overtime labor costs, which until now, has been necessary prior to many holidays where rolls were in so much demand. I am passing this information along to those in our industry who have never stored this bakery product in the hopes that it may assist them to sell this idea to the bakeries in their respective areas."

NARW Meetings

THE fall meeting of the Great Lakes Chapter NARW will be held in the Statler Hotel, Cleveland, Wednesday, October 15. All members of the Chapter have received a detailed announcement from Chairman Harry Foster of Cincinnati.

The new Executive Committee of the National Association will hold its fall meeting in Cleveland October 14 an 15. Part of this meeting will coincide with the Great Lakes Chapter meeting.

Refrigerated Storage For Sweet Potatoes

PROGRESS report 1454 of the Refrigeration Research Foundation, Texas A & M College system, College Station, Texas, by Ralph Michael and Joe P. Hollingsworth, reports studies in which Porto Rico variety sweet potatoes were stored comparatively at a temperature of 60 F and average relative humidity of 76 percent, and also without refrigeration at an average air temperature of 76 F and average relative humidity of 66 percent. The storage period began April 6 and continued for 119 days.

Their conclusion is that "with refrigeration during warm weather, sweet potatoes can be stored successfully in Texas from one harvest to the next." Observations indicated that the shelf life of the sweet potatoes was not impaired by the refrigeration. There was little sprouting of the potatoes stored under refrigeration, even after 119 days. Sprouting was quite noticeable on the potatoes held without refrigeration even after 30 days, and at the end of 90 days, in storage, all of the unrefrigerated potatoes were unfit for market because of sprouting. After 119 days in storage, the refrigerated sweet potatoes showed a total loss in weight of 14.3 percent, whereas those not refrigerated lost 42.2 percent in weight.

The authors also report some data on their facilities and power costs. The building used, a commercial storage, is constructed of 8-inch hollow tile and the only alteration made in the room where refrigeration was used was the addition of a layer of structural insulating board as a false ceiling. The room was cooled with five 8-ton self-contained air conditioning units equipped with ceiling ducts. For potatoes, estimated average cost of electricity from April 1 to August 1 was 1 to 1¼ cents per month per bushel.

Missouri Valley Chapter Elects Officers

SUCCEEDING Herber Steinmeyer, St. Louis, as chairman of NARW's Missouri Valley Chapter, George D. Brown, Wichita, was elected for the coming year at the June meeting of the Chapter held in St. Joe. Other officers are: Vice Chairman, H. W. Sumner, Kansas City, Kan.; Treasurer, Walter H. Rathert, St. Louis; Executive Committee members are: B. O. Deeny, Mason City, Ia.; Don L. Baer, Wichita; H. A. Steinmeyer, St. Louis; Harry Spradling, Jr., Carthage, Mo. A. F. Versen, St. Louis, was re-appointed Secretary.

June 30 Cold Storage Holdings

UTILIZATION of public cooler storage space by the end of June had increased to 63 percent while freezer occupancy remained unchanged at 77 percent, according to warehouse reports received by the Department of Agriculture. Although freezer occupancy was above average for this time of year by 7 points, utilization of cooler space was a percentage point below the 1947-51 average for the first time since March, 1952.

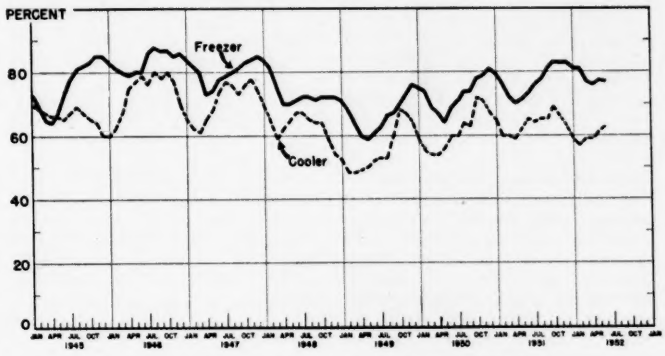
The June seasonal increase in both cooler and freezer utilization fell short of the change indicated by previous performance. Cooler occupancy reflected only half the average June increase and was only two-thirds as great as the increase last year; freezer occupany showed no change since May 31 as compared with an average 2-point increase during June indicated by the 5-year average pattern.

Several areas, however, did report gains in freezer occupancy up to 3 points. Middle Atlantic, Pacific Coast, and West South Central storages reported higher freezer occupancy on June 30 than the month previous, while al lother areas either indicated no change in freezer utilization or decreases ranging down to 2 percentage points.

National stores or refrigerated foodstuffs increased during June and by the end of the month totaled 3.6 billion pounds—the second highest on record for this time of year. Only once before, on June 30, 1944, a greater weight was reported in storage totaling 3.8 billion pounds. Cooler stored commodities at 1.3 billion pounds reflected a gain of 102 million pounds which compares with an average June gain of 66 million pounds. While above average gains were reported for cooler stored items, freezer weights reflected a June increase of only 88 million pounds which was about a fifth less than average and was the smallest June gain on record for this time of year.

June gains were reported in storage holdings of selected fresh fruits, potatoes, and numeats while stocks decreased during the month for onions, celery, other fresh vegetables, dried and evaporated fruits, canned fruits and vegetables, and nuts in shell.

Frozen fruit stocks by the end of June reached a total of approximately 224 million pounds for a net gain during the month of 26 million pounds. The net increase was more than 10 percent less than average and more than a third less than the increase last year. All frozen fruit stocks were not expected to increase as during this time of year seasonal gains are generally reported in berry stocks, only. Frozen apples, apricots, blueberries, grapes, peaches, plums and prunes reflected net seasonai withdrawals in amounts about equal to the average change for this time of year. Cherry stocks were reduced at a rate three-fifths greater than average. Slight gains were reflected



Occupancy of refrigerated warehouses, 1945-1952

TABLE 1—COLD STORAGE HOLDINGS IN PUBLIC, PRIVATE AND SEMI-PRIVATE WAREHOUSES, APPLE HOUSES AND MEAT PACKING PLANTS (000 LBS.)

	June 30, 1952	May 31, 1952	June 30, 1951	Five-year Average
Meat and meat products, lbs.	1,026,003	1,095,209	778,413	697,877
Lard and rendered pork fat, lbs.	130,867	105,749	68,754	133,099
Frozen poultry, lbs.	174,461	185,688	112,369	116,039
Creamery butter, lbs.	69,739	30,821	72,598	93,033
American cheese, lbs.	194,094	164,654	204,009	168,939
Other cheese, lbs.	19,812	16,435	24,127	23,262
Shell eggs, cases	3,333	3,184	2,427	3,651
Frozen eggs, lbs.	165,865	145,863	189,980	209,818
Apples, bu.	269	1,037	680	
Frozen fruits, lbs.	223,980	197,755	256,863	247,723
Frozen vegetables, lbs.	346,031	301,739	290,321	235,802
Frozen fish, lbs.	146,834	123,762	127,351	109,795

TABLE 2—PERCENTAGE OF SPACE OCCUPIED BY PUBLIC COLD STORAGE WAREHOUSES (APPLE HOUSES EXCLUDED)

	Net Piling Space (000 cu. ft.)		June 30, 1952 (%)		May 31, 1952 (%)		June 30, 1951 (%)		5-Year Average (%)	
	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer
New England	3,045	5,893	42	74	36	74	47	71	54	65
Middle Atlantic	32,337	31,737	57	79	56	76	59	73	55	69
East North Central	27,484	24,939	73	81	68	83	77	77	74	70
West North Central	8,032	15,077	75	88	72	88	68	82	74	78
South Atlantic	7,466	9,443	60	79	63	80	68	80	70	76
East South Central	2,343	3,296	86	94	60	94	83	88	81	87
West South Central	7,277	7,765	68	65	65	64	66	62	69	65
Mountain	1,457	2,521	73	78	72	79	56	63	66	70
Pacific	13,416	22,562	50	65	54	62	53	65	49	66
United States	102,857	123,233	63	77	61	77	65	73	64	70

TABLE 3—PERCENTAGE OF SPACE OCCUPIED BY PRIVATE AND SEMI-PRIVATE REFRIGERATED WAREHOUSES AND MEAT PACKING PLANTS (APPLE HOUSES EXCLUDED)

	Private and Semi-Private Warehouses						Meat Packing Exablishments					
	Net Piling Space (000 Cu. Ft.)		Space Occupied—Per Cent June 30, 1952		May 31, 1952		Net Piling Space (000 Cu. Ft.)		Space Occupied—Per Cent June 30, 1952		May 31, 1952	
	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer
New England	7	6	50	50	...	...	61	.....	74	..	..	..
Middle Atlantic	1,945	1,695	21	83	30	56	1,470	243	68	85	63	78
East North Central	2,183	4,968	69	61	72	63	3,570	1,696	91	64	86	88
West North Central	460	2,104	78	78	75	69	7,266	5,146	87	98	87	91
South Atlantic	469	3,460	13	72	12	61	410	204	100	100	81	100
East South Central	.....	18	..	75	..	..	67	44	100	100	100	85
West South Central	248	69	58	97	89	92	75	116	100	100	100	100
Mountain	368	.....	44	..	..	..	147	168	89	100	86	100
Pacific	3,397	2,096	17	59	18	36	381	293	88	96	88	91
United States	9,077	14,416	35	66	43	59	13,447	7,910	87	93	85	91

NOTE: Blank spaces indicate that insufficient returns were received.

in June 30 stocks of blackberries and Young, Logan, Boysen and similar berries, while frozen strawberry stocks showed a June increase of 45 million pounds which was about average. Total strawberry stocks at 113 million pounds were exceeded only by the record June 30 stocks of last year when 128 million pounds were reported in storage.

More than a third of the national holdings were in West Coast storages while approximately a tenth of the total were in each of the Middle Atlantic, East North Central, West North Central and East South Central storages. Frozen orange concentrate stocks of about 17 million gallons in South Atlantic storages comprised almost three-fifth of all concentrate stocks reported in storage on June 30 which amounted to 29 million gallons.

Frozen Vegetables

Frozen vegetable stock on hand the end of June had increased by twice the amount reported last year and during June for the 5-year period ended 1951. The 44 million pound increase brought national holdings to 346 million pounds which exceeded the previous June high (1951) by 56 million pounds. Much of this sharp net gain was attributable to the seasonal increase in frozen peas which totaled 48 million pounds bringing the national holdings on June to 113 million pounds.

National holdings of cream were up to 49 million pounds as June storage gains totaled 22 million pounds. This net increase was slightly better than average for this time of year.

Creamery butter stocks, while below the June 30 average and 1951 stocks, with almost 70 million on hand reflected a June net increase of 39 million pounds which was greater than last year but about equal to the average June increase.

Cheese holdings reflected about average seasonal gains and by the end of June national holdings were up to 222 million pounds. Of this amount, 194 million pounds were American Cheddar which compares with 204 million in storage last year and 169 million average in storage June 30.

Shell Eggs

Shell egg stocks did not reflect any great seasonal gain during June. Of the total in store, reported stocks owned by the Government totaled 206,000 cases and in addition there were approximately 226,000 cases of eggs reserved for sale to the Government beginning September 1.

Poultry holdings were reduced during June to 174 million pounds as net withdrawals totaled 11 million pounds. The June decrease was less than average and the net decrease last year, but total stocks were about half greater than 1951 stocks and average June 30 stores.

Greater than average net withdrawals during June reduced national holdings of meats to a little more than a billion pounds. Beef stocks reflected a net decrease about three-fourths greater than the average June withdrawal and by the end of the month holdings were down to 185 million pounds. This compares with 90 million in store last year and 83 million pounds on hand June 30 during the 5-year period ended 1951. Pork stocks were down 40 million pounds to 688 million by June 30 and of this amount frozen pork totaled 461 million pounds. Not since 1944 has there been as much pork in storage on June 30 and frozen pork stocks were at an all-time high for an all-time high for this time of year.

By the end of June, total holdings of fishery products were 169 million pounds as compared with 159 million last year. Frozen fishery products increased approximately 23 million pounds to 147 million pounds while cured fishery stocks increased 22 million pounds.

Storage Outlook

According to past performance public cooler occupancy generally remains unchanged during July yet it is not unlikely for an increase of about 1 point to occur during the month. On the other hand, freezer storage occupancy is expected to increase two points during July although during June the monthly change did not follow the historical pattern. Since no increase in freezer occupancy was reported during June whereas in the past a 2-point rise prevailed, the peak expected in the late fall may be nearer the level reached last year despit the arlier start of the upward cycle this year.

Canadian Holdings of Fruits and Vegetables

THE Dominion Bureau of Statistics, Agricultural Branch, reports the following commodities held in cold storage on June 1, 1952.

Apples in cold and common storage June 1, amounted to 96,000 bushels compared with 267,000 bushels May 1, and 267,000 bushels last year.

Frozen fruit holdings in storage and plants June 1, amounted to 22,408,000 lbs., compared with 26,407,000 lbs. May 1 and 22,479,000 lbs. June 1, 1951.

Stocks of frozen vegetables in storage and plants on June 1 amounted to 7,195,000 lbs., compared with 8,640,000 lbs. May 1, and 8,180,000 lbs. June 1, 1951.

Pork Outlook

THE United States Department of Agriculture reports that breeding intentions for the fall pig crop indicate a total of 5,566,000 sows to farrow. This is 9 per cent below the number farrowing last fall. The combined 1952 spring and fall pig crop is now expected to be about 93 million head.

Storage of Cranberries—Study Shows Temperature and Relative Humidity

AN investigation conducted by The Refrigeration Research Foundation in the storage of cranberries has resulted in determining the most appropriate storage temperature and relative humidity. Cranberries, the report states, are produced in Massachusetts, New Jersey, Wisconsin, Washington and Oregon, but chiefly in the two states named first. Harvest of early black variety is usually in September and of Howes (the other leading variety) in October. The crop may be stored under refrigeration after harvest or there may be a period of storage near the bogs in picking boxes in screenhouses or other buildings. The berries are cleaned and packaged before shipment to market centers.

Production varies from about 60 to 85 million pounds annually. Almost half the total production is canned and substantial quantities were dried during the war. Storage operators are interested in those held in market centers and in extension of storage so that fresh fruit can be sold over as long a period as possible. There is also considerable freezer storage of cranberries for subsequent processing.

Keeping Quality

Storage: Keeping quality of cranberries is determined by the maturity of the fruit. There is sometimes a difference in storage life of cranberries from the same bog from year to year. (A Foundation sponsored research at the University of Massachusetts is presently directed to getting more knowledge and a practical solution of these problems).

For very long storage, it is customary to hold cranberries in field crates without cleaning or sorting. Cleaned and sorted cranberries can be stored for five to eight weeks at 32F. But thereafter the berries held at this temperature may begin to show "low temperature breakdown."

Poorly colored fruit is sometimes stored at 45 to 50F. in order to hasten the coloring but such fruit does not keep as well as the well colored, well matured cranberries.

Levine, Fellers and Gunness of the Massachusetts Agricultural Experiment Station comparing storage after picking, with and without mechanical refrigeration, concluded that storage losses can be reduced 5 to 10 per cent by keeping cranberries at 35 to 45F. compared with natural storage in ordinary screenhouses at 50 to 60F. Screenhouses usually have too high a temperature during September to store the cranberries well, although later in the season they may carry the fruit more satisfactorily.

Prepackaging

Levine, Fellers and Gunness also reported that in experiments with early black and Howes varieties packed in various cellophanes (single and double) and pliofilm, results were good when the packages were held at 35F. Sampling of atmosphere in the bags did not reveal any accumulation of carbon dioxide. At 8 to 10 weeks, losses had not exceeded approximately 10 per cent with Howes and were somewhat greater with Early Blacks. Ordinary kraft paper bags proved inferior as packages. Puncturing the bags was not helpful. Apparently the berries received adequate air. Comparable berries in hermetically sealed jars spoiled completely within a week at room temperature and within three to four weeks at 35F.

Hruschka and Kaufman, Bureau of Plant Industry, Soils & Agricultural Engineering, USDA, have reported good results with a semi-moisture proof cellophane (punctured) and with window-box packages. The windows were of 100 CA (cellulose acetate) and were unsealed. Their samples were packed in corrugated cases, 24 one-pound packages per case. Carbon-dioxide content of the packages never rose as high as 1 per cent. Packed thus, storage of early black cranberries was successful for eight weeks and fairly good for 12 weeks at 33 and 38F. In this single year's test, there was more spoilage in Howes which were held successfully for four weeks and were fairly good for eight. There was no evidence of smothering due to tightness of the pack.

McFarlin A Poor Keeper

Hruschka and Kaufman have recently studied the McFarlin variety which is regarded as a "poor keeper" and the tests with prepackaging confirmed this trade opinion. Low-temperature breakdown and decay were prominent and appeared especially in the week after removal from cold storage. The results indicate advisability of marketing McFarlin berries rapidly and holding 36-38F., if storage is necessary. Late Howes used for comparison held up for 8-12 weeks at those temperatures.

Limiting Factors

End rot is a fungus disease that develops at low temperature and is progressively slowed down as temperature is lowered. Like most decay and rot, it is best controlled by sanitation and early application of low temperature. Shrivelling of berries through loss of moisture may also be a limiting factor of storage. So-called "low-temperature breakdown" (development of rubberiness and dissemination of skin pigment throughout the berry) is less likely to occur at 36F. or above than at 30-32F. This disease may sometimes be mistaken for freezing injury. The berries in the former case are rubbery; when squeezed between the fingers, they are without luster and the tissues internally are stained with red pigment.

The average freezing point of cranberries is 27.2F. with average maxima and minima of 27.7 and 26.7F. respectively.

Summary

1—Most appropriate storage temperature for fresh cranberries is 36 to 40F. Lower temperatures (30-32F.) accelerates low temperature breakdown or "rubberiness" of berries. Higher temperatures (above 38F.) reduces this danger but allows greater decay. Poorly colored fruit is sometimes stored temporarily at 40-50F. to aid coloring. Frozen berries are held at 0F. and below.

2—Relative humidity for fresh cranberries should be 85 to 90 per cent, that is, fairly high to reduce loss of moisture and weight.

3—Storage period varies with seasons, maturity and previous handling. With some lots, it will be as short as four to six weeks and with others twelve weeks or longer. Inspection at intervals is advisable.

4—Properly prepackaged cranberries can be kept about as well as those packaged in other ways. Ordinary Kraft paper bags have not proved as satisfactory as cellophanes and window-box packages. Even in packed cases, the latter packages have not "smothered" the berries as indicated by low carbon-dioxide content inside the packages. The McFarlin variety has been found to be a "poor keeper" as compared with early black and Howes.

FrozenFoods
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PREPARATION PACKAGING FREEZING STORAGE DISTRIBUTION DESIGN CONSTRUCTION EQUIPMENT

Dry Ice for Transportation of Frozen Foods

TO determine whether dry ice can maintain, in the heat of summer, the extremely low temperatures required in the transportation of frozen foods, the U. S. Department of Agriculture conducted an experiment with a refrigerator car.

The refrigerating system was installed in a Pacific Fruit Express car and the test was conducted at the Fruit Growers Express Company's car-testing laboratory, Potomac Yards, Va., where an attempt was made to simulate a transcontinental rail trip under extreme weather conditions.

The car was built in 1930 and rebuilt in 1948. It has plywood sheathing inside and out. Four hatch covers are located on the end of the car, and provide access to the bunker, pressure tank, and refrigerating equipment. The flow of refrigerant through the car was controlled by thermal-controlled valves, which in turn regulate the temperature of the load.

Initial Icing

The car was initially iced at Jersey City, N. J., on January 11, 1952, just prior to loading. Icing started at 5 a.m. and was completed at 6:45 a.m. At this time approximately 12,000 pounds of dry ice were placed in the bunker and 2,000 pounds in the pressure tank. The thermostat on the refrigerating unit was set at this time to hold a temperature of —15 F. On the following morning, the bunker was recharged with an additional 1,300 pounds at Potomac Yards, Va., before the car was placed in the test laboratory for the 10-day period. Although the bunkers were checked several times during the test, no ice was added and some ice remained at the end of the test period.

The car was loaded with 5,200 cases of frozen peas at Union Terminal Cold Storage Company at Jersey City, N. J., on January 11, 1952, between 8:30 and 11:30 a.m. The billing weight of the product was 54,600 pounds. Commodity temperatures taken with hand thermometers during loading averaged —5 F. After loading was completed, the car was consigned to the car-testing laboratory at Potomac Yards.

While the car was in the process of being loaded, 21 electrical resistance thermometers were strategically placed throughout the car and the load in order that commodity and air temperatures could be obtained, whenever desired, for the duration of the test.

After loading was completed, the car was transferred to a railroad yard where it was assigned to a regularly scheduled freight train which departed from Jersey City, N. J., at 10 p.m. Three temperature readings were taken from the time loading was completed until the train departed for Potomac Yards, and all showed a very sharp drop in commodity and air temperatures. Other readings were taken en route at Baltimore, Md., and upon arrival at Potomac Yards, Va. Average top and bottom commodity temperatures of —6 F. and —6.5 F. respectively, taken immediately after loading, had dropped to —17.3 and —13.3 twenty hours later when temperature readings were taken at Potomac Yards just after the test car was placed in the test house. After the car was placed in the laboratory, temperatures were taken at four-hour intervals for the ten-day period.

Refrigeration and Heating

Equipment for refrigeration and heating was located in a compartment directly above the test chamber. The laboratory was constructed of wood with steel reinforced framework for supporting the heating and refrigerating equipment, coils, motors, fans, and so forth. Refrigeration was provided by two banks of ammonia evaporator coils, each with 1,250 square feet of cooling surface, consisting of 1½ inch pipes with necessary heaters and fixtures. One bank of ammonia coils was located in each end of the building, and a 48-inch three-blade propeller-type fan was adjacent to and back of each bank of coils.

The fans were directly connected to 3 hp motors, and each had a capacity displacement of 20,000 cubic feet of air per minute. These fans force air over the refrigerating coils toward each end of the building, then through hooded openings into the test chamber. A heating unit consisting of 385 linear feet of 2 inch pipe in a compact steam coil was located at the center intake area, between the two circulating fans and the refrigerating coils. Air was brought to the desired temperature as it was drawn up through the inlet ducts in the heating (or refrigerating) compartment on its way into the test chamber. With this equipment any air temperature between —20 and 150 F can be produced and maintained accurately.

Results of Test

Results of the test indicate that this system has ample capacity to refrigerate frozen foods however, its practicability in general service will depend on the cost and availability of dry ice.

The average of commodity temperatures for the entire load recorded immediately after the car was placed in the test house was —15.1 F. Twelve hours later this average had dropped to —16.7 F, which was the lowest average recorded for the entire test. From this point on, the temperature rose gradually to a high of —4.6, which was recorded after ten days, at the conclusion of the test. The average top and bottom temperatures of the load were —2.6 and —3.8 F respectively, just before the car was removed from the test house. Maximum temperature at this time was 5 F taken at the top end left side of the load.

On several occasions during the test slight temperature fluctuations were noted. It appears that these fluctuations were caused by the fact that as the dry ice melted pockets were formed, thus creating an uneven distribution of ice over the bunker coils. If this were the cause, it probably would have been eliminated if the car had been subject to the normal impacts and vibrations encountered in a regular movement.

In general, higher air and com-

modity temperatures were found at the end of the car opposite the unit. At the conclusion of the test temperatures as high as 5 and 2 F were recorded in this area, whereas the maximum temperature at the bunker end was —4 with a minimum of —8. It is believed that this condition could be improved by the installation of air-circulating fans.

As noted previously, the thermostat on the refrigerating unit was set at a temperature of —15 F. This was done at the request of the manufacturer. Since this setting was approximately 10 F lower than the average loading temperature of the commodity, it probably resulted in greater temperature variations as well as an increase in the amount of dry ice consumed in the test.

Cost Comparisons

The amount of dry ice actually consumed during the ten-day test period plus the amount of ice remaining in the bunker and pressure tank at the completion of the test amounted to approximately 13,880 pounds. Based on an actual cost figure of $65 per ton the dollar value of this amount of ice would be $437.22, which is considerably higher than the tariff rate of $158.70 quoted for similar service using water ice and salt, or a mechanical unit for refrigeration purposes.

It should also be noted here that the cost figure of $437.22 would normally be somewhat higher since it does not include the cost of precooling the car. No estimate on cost of precooling could be made in this test as the car was delivered for loading partially refrigerated (10 F) from a previous trip.

Dry Ice System of Truck Refrigeration Is Tested

A TEST to determine the refrigerating efficiency of a new type dry ice system of truck refrigeration was made recently by the United States Department of Agriculture. The test was made on truck trailers loaded with frozen citrus concentrate from Florida to Chicago, Ill. Two trucks were used, one equipped with a new type of dry ice bunker and the other a mechanical refrigerating unit.

The dry ice unit, installed in an insulated trailer, consisted of a dry ice bunker with finned surface and thermostatically controlled air circulation. The capacity of the bunker was 600 pounds of dry ice. In a precooling test of the empty trailer, an average air temperature of 0 F. was obtained by supplementing the full bunker charge with 150 pounds of dry ice broken up and spread over the floor of the trailer. After the dry ice on the floor sublimed, the unit was able to maintain 0 F with the bunker ice alone and the temperature rose to as high as 20 F. The average air temperature inside the trailer, after the bunker was re-iced with a full charge of dry ice, was reduced only 6 degrees in 4½ hours to an average of 22.5 F.

Road Tests

Local road tests under load showed that the use of pallets, simulating wooden floor racks, resulted in a smaller spread between average top and bottom commodity temperatures than with the conventional grooved metal floor. This was due to improved air circulation which resulted from the greater air space which was under the load.

In the transit test, the trailer was equipped with wooden floor racks. During this test the rise in average load temperature between loading and unloading was small (2.1 degrees). However, there was a greater fluctuation in product temperature en route. The maximum average temperature was 6.2 F. just prior to the first re-icing at Mongomery. Temperatures were somewhat more uniform than on the previous local road tests, the spread between top and bottom positions averaging 3.1 F. However, a considerable amount of extra dry ice, in addition to that in the bunker, was placed on the floor beside the unit. As the supply of dry ice in the bunker diminished, commodity temperatures rose in the trailer.

Dry Ice Meltage

The rates of dry ice meltage during these tests in pounds per hour were as follows: precooling test, 31 pounds; test with grooved metal floor surface, 21.9 pounds; test with pallets simulating floor racks, 24 pounds; and transit test 25.8 pounds.

Frozen-at-Sea Fish Delivered in Boston

THE Fish and Wildlife trawler Delaware delivered its first load of fish frozen-at-sea to the Boston fish pier recently. This experimental catch was offered for sale on the Boston Fish Exchange and was readily accepted by the trade. The boat planned to make another trip the following week. The frozen food and warehousing industry is watching this new development with much interest.

Frozen Foods

Measuring the Maturity Factor in Frozen Peas

TO PROVIDE evaluation of testing procedures for maturity in frozen peas in terms of eating quality, several scientists in the Western Regional Research Laboratory have applied physical and chemical tests to 68 samples of four varieties and have compared the results with scores of a trained panel of judges. Dr. Rachel Makower presented the results at the meeting of the Institute of Food Technologists in Grand Rapids, Mich., June 11. Authors of the report are Rachel U. Makower, Mildred M. Boggs, H. K. Burr, and U. S. Olcott.

Of the various tests, the test for percentage of solids that are insoluble in alcohol showed the closest correlation with the trained testers' scores. While this test requires time and is somewhat laborious in application, it is possible that modification might improve its suitability for routine determination of maturity.

The test for density was found to be difficult to apply with precise results, and even when precise data on density were obtained they were found to be correlated only moderately well with the scores of the taste panel. This fact places a limit on the reliability of flotation tests.

Two other tests, for percentage of total solids and for degree of tenderness as registered by the well known tenderometer on cooked peas, yielded results that were moderately well correlated with the tasters' scores. Determination of total solids is a fairly time-consuming test, but use of the tenderometer provides comparatively quick results and this method deserves further investigation.

These studies are considered to be significant for two main reasons: their coverage of a wide range of samples and their employment of advanced taste-panel methods. The samples represented four varieties, three seasons, and several harvest dates and size classifications. The Utah Agricultural Experiment Station collaborated by supplying the raw materials, which were shipped by air express to the Western Regional Research Laboratory in Albany, California, where they were carefully prepared, frozen, and used in the studies reported. The varieties were Thomas Laxton, Rondo, Oracle, and Dark-Seeded Perfection.

Refrigerator Car and Truck Shipments of Frozen Concentrate

IN March 1950, the lForida processors of frozen citrus concentrate asked the Department of Agriculture to study temperatures maintained in railroad and truck equipment in current service.

Four tests were conducted in 11 refrigerator cars using three different methods of refrigeration—mechanical refrigeration, dry ice, and water ice plus 30 percent salt. The lowest temperatures were provided by two mechanically refrigerated cars. Concentrate temperatures were maintained within 0.5 degree of the loading averages, -1.5 and -3.5 F. in two tests and reduced 5 degrees from an average of 0 F. in another test, indicating ample refrigerating capacity. The maximum temperature found in these cars was 4 F.

Temperatures

Two of the three dry-ice cars maintained average commodity temperatures at or slightly below loading temperatures, -3 and 0.5 F. During the transit period the third dry-ice car, which moved in warmer weather showed a 6.5-degree rise in average temperature and maximum temperatures as high as 9 F.

One overhead-bunker car had a 5.5-degree rise in average temperature during transit, from -2 to 3.5 F, with a maximum commodity temperature of 11.5 F. The average temperature in a similar car used in another test rose from -1 F at origin to 7.5 F immediately before unloading, with a maximum of 16.5 F. The maintenance of lower temperature in the first overhead-bunker car was believed due principally to the brine-retaining tanks in the car, which appear to be more effective than the overhead-basket type bunker used in the second car.

One end-bunker-fan car with 1,000 pounds of dry ice on top of the load had a 3.5-degree temperature rise, from 1.0 to 4.5 F, with a maximum of 9.5 F. Another fan car with paper over the load had a much greater temperature rise during transit, 9 degrees, but the average temperature at destination was 4 F, about the same as the first overhead-bunker car and the fan car with dry ice on the top of the load. The fan car with ice and salt only had the highest temperatures. Commodity temperatures rose from an average of -1 F at origin to 10.5 F at destination.

Truck Tests

Truck tests were conducted from April through October 1950 with 23 trucks, two using dry ice and the rest mechanical refrigeration. In the dry-ice tests, commodity temperatures rose 8 to 24 degrees above the uniform loading average of -12 F, with an average rise of 19 degrees in 48 hours. This rise was believed due to insufficient insulation in the trailer and lack of air circulation because the load was covered with a heavy tarpaulin.

With regular loading and operation of the mechanical refrigerating units, load-temperature averages at destination ranged from -2.5 F to 10 F, and average rises up to 9 degrees were recorded. Maximum temperatures of 16 F and 18 F were found at certain positions in the bottom layers of the loads, believed to be caused by inadequate air circulation around the load.

Return Air Duct

To improve this condition, a return air duct was constructed on the units to draw return air from the floor instead of over the top of the load. In addition, a modified loading plan was put into effect in which channels were provided at each side wall along the floor the full length of the trailer to increase air movement down the side walls. With these modifications in three tests in which the units operated properly, average commodity temperatures were reduced from 2.5 to -0.5 F in one test and from 2.5 to -3 F in another. In the third test the average commodity temperatures rose 7.5 degrees because the packages shifted forward under the return air duct, but the load average at destination was only 1 F because of the low loading temperature of -6.5 F.

Mechanical Difficulties

Refrigeration capacity was adequate, but mechanical difficulties arose in a number of tests. Some drivers were not trained to maintain satisactory operating conditions. It is believed that attention should also be given to scheduling shipments to eliminate extended layovers en route. from week end closing of destination warehouses.

During loading of rail cars, protection of the commodity from outside temperatures was fairly adequate, but none was provided during loading of trucks. Furthermore, both rear doors of the truck trailers remained open throughout the time of loading, exposing the inside of the trailer to heat from the outside air and materially reducing the effects of precooling. The commodity was also exposed to high outside temperatures when pallets or hand trucks were used in loading and unloading. Every precaution should be taken to conserve refrigeration and prevent undue temperature rise of the product.

Frozen Food Packers Survey Refrigerated Motor Carriers

A SURVEY of refrigerated motor carriers is being conducted by National Association of Frozen Food Packers. The purpose of the survey, according to the Association's headquarters in Washington, D. C., is to assemble comprehensive information on the equipment and services provided by truck carriers. If adequate data are obtained, a listing of motor carriers, their equipment and other pertinent information will be incorporated in a directory and made available to the industry.

The motor carrier survey is a project of the Association's Transportation Equipment Committee, under the chairmanship of B. M. Angell, of Stokely Foods, Inc., Indianapolis, Ind. Also serving on the Committee are L. A. Campbell, Pictsweet Foods Inc., Mt. Vernon, Wash., and C. E. Edin, Cedergreen Frozen Pack Corporation, Bellingham, Wash. The Committee earlier prepared a listing of railroad refrigerator cars acceptable for transporting frozen foods, and the survey now under way is another phase of the Committee's continuing study of transportation equipment.

Frozen Food Exposition

GRAND Central Palace, New York City, has been leased by the Frozen Food Exposition of America to house the frozen food industries exposition to be held for four days, April 20 to 23, 1953. The exposition will include every segment of the frozen food industry, including refrigerated warehousing.

Four floors of the Palace, with its 80,000 square feet of exhibition space, have been contracted for, making this the biggest exposition ever undertaken for the frozen foods industry. The Frozen Food Exposition of America organization maintains headquarters at 20 East Herman Street, Philadelphia.

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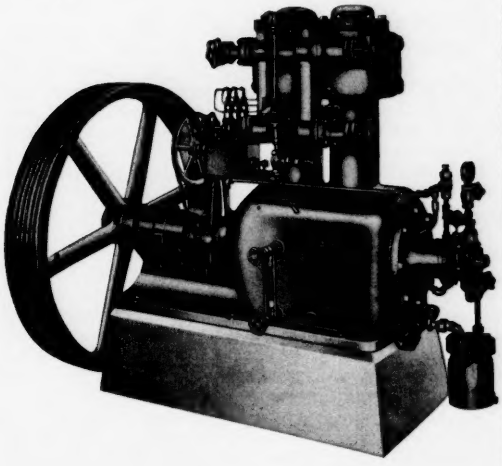

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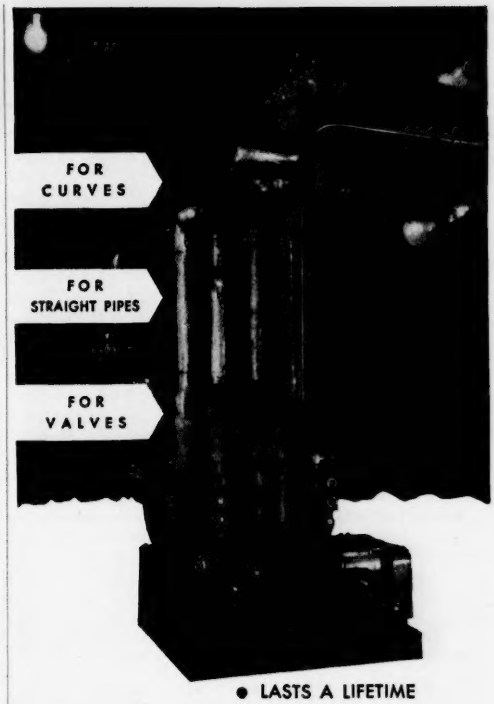

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Transportation Of Frozen Poultry In Mechanically Refrigerated Trucks

AN interim report on tests on transportation of frozen poultry with mechanically refrigerated trucks has been made by Harold D. Johnson and Martin V. Gerrity, Marketing and Facilities Research Branch, U. S. Dept. of Agriculture.

The transportation tests covered by this report are part of a broader study of the use of various methods of refrigeration in the transportation of perishable agricultural products by motor truck, a field in which not much research has been done. For this test frozen poultry was shipped from Pocomoke City, Md. to Chicago, Ill. during August and October, 1951.

The four semi-trailers used in the test were standard 32-foot tandem units with six inches of insulation. In each of the railers the mechanical refrigerating unit was located high in the nose of the trailer, with the engine, compressor, and operating controls on the outside and the evaporator and fan on the inside.

Two Tests

Two tests were conducted in order to determine if lower transit temperatures than those maintained with the usual equipment could be obtained in mechanically refrigerated trucks equipped with return air ducts and loaded in such a manner as to provide better air circulation along the bottom of the loads. Each test was made with two truck-loads of frozen poultry.

One truck in each test was loaded and refrigerated in the conventional manner, whereas the other used a modified load plan and had a return air duct attached to its refrigerating unit. Temperatures recorded at frequent intervals during transit tests revealed that substantially higher temperatures were found in the trailers that were not modified. Relatively high temperatures were found in the bottom of the load in all four trucks. Previous tests have shown this to be caused by poor air circulation due to insufficient clearance under the load without adequate floor racks.

Precooling tests conducted with three empty trailers prior to the transit tests showed that the average time necessary to precool this type trailer to 0 F. with the outside temperature ranging from 52 to 80 F. was 2 hours and 16 minutes.

The trailers under observation were equipped with grooved metal floors, the channels of which were too small to provide adequate movement of air under the load. Neither did they have any strips or other means for the passage of air down the side walls of the trailer, and as the packages were flush against the walls, no movement of air was possible around the side of the loads.

In previous tests of trailers, similarly modified, in the transportation of frozen citrus concentrate, better results than found in these tests were obtained with trailers that had vertical strips nailed to the side walls, providing air spaces which permitted some movement of air down the wall surface to the side channels in the bottom layer. No side strips were possible in these tests because the inside sheathing of the trailer was of metal.

It appears that without adequate under-load and side-wall circulation, even with the channels provided along each side wall by omitting a row of packages in the bottom layer in the modified trailer, sufficient cold air did not get to the places where it was needed to protect the frozen product.

Source of Bacteria In Frozen Vegetables

STUDIES on the source of bacteria in processing and their significance in frozen vegetables have been made at the New York Experiment Station, Geneva, N. Y. by G. J. Hucker, R. F. Brooks and A. J. Emery. Their report on this thorough study was published in the April 1952 issue of Food Technology.

Briefly summarized, their studies with over 5,000 samples of peas, corn and beans showed little, if any relation between count on entering freezing storage at plus and minus 10 and also 0, on the one hand, and quality after 6 and 12 months' storage. They found evidence that there is a "base" of cold resistant bacterial flora in these frozen vegetables and that plus 10 is a little more effective than 0 and minus 10 in getting counts down to this base (an odd effect also noted by other investigators); that is, the "base" varied measurably but with doubtful significance at these three storage temperatures. To quote, "There did not appear to be a direct relation between visible sanitary condition of the equipment and the number of organisms present." There was an evident relationship between initial count and count after storage, but there was pronounced reduction in samples with the higher initial counts.

These workers used the taste-panel method for color, flavor, taste and texture evaluations, as well as chemical tests for retention of important vitamins, in their evaluations of quality. Their studies indicate, as others have shown, that storage above 0 F results in excessive loss of ascorbic acid.

Commenting on this report, the Information Bulletin of The Refrigeration Research Foundation points out that "the industrial and research thinking that such studies stimulate goes on constantly and is, of course, a primary value and objective. For one thing, without minimizing the real need for still greater progress in sanitation, the studies suggest that new advances in quality will carry us further into studies of chemical and physical change, and means for understanding and control of changes. Obviously the investigators at Geneva did not suggest that sanitation be ignored because of the rather unique results they got.

Examples

"Examples are plentiful. The Western Regional Laboratory has shown that viner action and submergence of peas in water can cause a rather rapid-moving flavor change that is chemical rather than bacteriological in nature. Studies by various governmental and industrial research workers have shown that enzyme action is the important factor in cloud stability of frozen citrus concentrate. Etching of cans is, of course, chemical. The stripping of essences and their use in new concentrated juices is a phase of modern food chemistry that is only well begun. Packaging is a physical and chemical field that is making strides.

"These are few examples that suggest large opportunities for physical and chemical research in foods, in addition to bacteriological. Widening knowledge also opens opportunities for refrigeration as an effective and economical method for control and even use of chemical changes. Electronic sterilization may prove to be very useful and we can look for rapid strides in radiation science and its application in medicine and possibly foods. We have strayed somewhat from our original subject, but it seems to be a good opportunity to remind ourselves that our aim in refrigeration is not only to stop bacteria. Our aim is to bring to a halt, or very slow pace, all of the numerous chemical and physical changes that occur when a fine, fresh, top-quality product begins to spoil."

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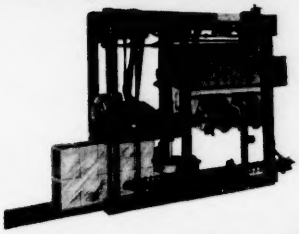

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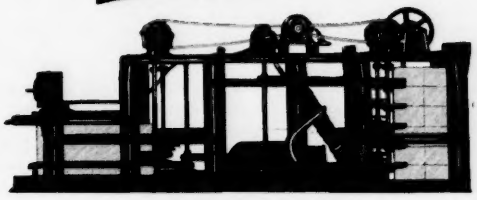

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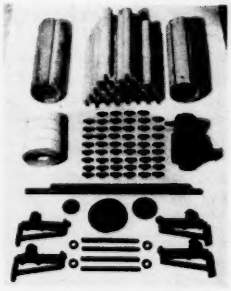
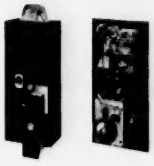


The first "Ready-to-Assemble" Ice Vending Equipment ever offered the Ice Industry.

Your Plant personnel can cut vendor costs by assembling the Eskimo Ice Vendor Kit—and you save on freight and labor.



The National Rejector's Coin Mechanisms have a separate cash box, multiple coin handling (5c-10c-25c) rejects bent or counterfeit coins. Sale price can be changed easily with no additional parts or expense.

The Eskimo Kit is complete, with the exception of the lumber, wiring and metal for the delivery chutes. All these materials are available locally, which saves additional freight.

You receive the bearings, end drums, idling rollers, heavy belting, gear head motor, sprocket chains and National Rejector Coin Mechanism. Complete instructions for assembly and operation.

PROMPT DELIVERIES

PROVED IN ACTUAL USE

Eskimo vendors have been developed and perfected by Ice Dept., Central Power & Light Co., Corpus Christi, Texas and have been in use over 6 years.

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P.O. BOX 1121 • FORT WORTH, TEXAS

We distribute nationally — S & S VENDORS and Vendor Stations

Temperature Standards Extended Low and High

R. E. WILSON
Chief, Temperature Measurements Section, National Bureau of Standards

AS a result of the increasing need for reliable temperature measurements at both very high and very low temperatures, the National Bureau of Standards is extending its temperature standardization program toward the extremes of the temperature scale. New instruments and methods of calibration are being developed for these regions, and research efforts are being directed toward the extension of the International Temperature Scale to provide greater accuracy and reproducibility in the measurements thus made possible. This work is part of a continuing NBS program which seeks to provide Amerian science and industry with temperature standards and measurement methods over as broad a range and to as high precision as possible.

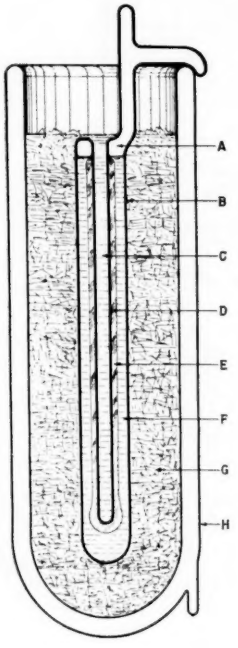

Diagram of the NDS triple point cell (B, D) in use in an ice bath (G) within a Dewar flask (H). A: Water vapor. C: Thermometer well. E: Ice mantle. F: Liquid water.

While the accurate measurement of temperature has long been of interest to the research scientist, its importance, particularly at the extreme ends of the scale, has greatly increased with the rapid technical developments of recent years. During this period, many improvements in processes for the production of steel, glass, gasoline, and other important commodities have resulted from the increased precision that is being attained in the measurement and control of temperature. In aeronautics there are new temperature problems in connection with the use of jet propulsion and the operation of aircraft at high altitudes and in polar regions. To attain the desired performance in jet engines, fundamental research is required to develop methods of measuring temperatures of flames and to develop temperature-sensitive devices for indicating performance and controlling operation.

For use at jet-engine temperatures as well as in arctic cold, mechanical parts must be specially designed using materials capable of withstanding these extremes in order to function satisfactorily. Likewise, as a result of the applications of atomic energy, it has become necessary to learn more about the heat-transfer properties of a variety of materials at increasingly high temperatures. For effective research in these fields, temperatures must be accurately measured, and the results of one laboratory must be comparable with those of another.

To provide a fundamental basis for precise temperature measurements, a scale of temperature has been established which covers the range from the boiling point of oxygen to the highest temperatures of incandescent bodies and flames. This scale, known as the International Temperature Scale, is based on six reproducible equilibrium temperatures, or "fixed points", to which numerical values are assigned, and upon specified interpolation formulas relating temperature between or above these points to the indications of standard temperature measuring instruments.

TABLE I. FIXED POINTS[a] OF THE INTERNATIONAL TEMPERATURE SCALE OF 1948.

Fixed Point	Temperature °C
Oxygen point — Temperature of equilibrium between liquid oxygen and its vapor.	−182.97
Ice point (fundamental fixed point) — Temperature of equilibrium between ice and air-saturated water.	0.00
Steam point (fundamental fixed point) — Temperature of equilibrium between liquid water and its vapor.	100.00
Sulfur point — Temperature of equilibrium between liquid sulfur and its vapor.	444.60
Silver point — Temperature of equilibrium between solid and liquid silver.	960.80
Gold point — Temperature of equilibrium between solid and liquid gold.	1,063.00

[a] Under the standard pressure of 1,013,250 dynes/cm²

Book Review

TECHNIQUES OF PLANT MAINTENANCE. Published by Clapp & Poliak, Inc., New York. 182 pages, cloth binding. 8½x11 inches. Price $6.00. For sale by Nickerson & Collins Co., Chicago, Illinois.

THIS book, which contains the proceedings of the Annual Plant Maintenance Conference, is highlighted by the text of 717 questions propounded by 2,100 engineers from major industries. It thus represents a cross-section of current industrial engineering thought on maintenance problems. Texts of all papers read at panels are included, and the papers are illustrated by 49 charts, diagrams, graphs and tables. The papers are divided into groups of general and specific interests and each group is followed with a question-and-answer section.

There are chapters on maintenance of electrical equipment; plant buildings; training maintenance workers and supervisors, and project preparation and cost control. Separate treatment of maintenance problems is given in fire chapters.

British Exports of Refrigerating Machinery

DURING April refrigerating machinery to the value of $3,937,785 weighing 2,527 tons was exported from Great Britain. Comparable figures for April, 1951 were 2,517 tons. Of the 2,527 tons, 50 tons went to British West Africa, 108 tons to the Union of South Africa, 66 tons to Southern Rhodesia, 106 tons to British East Africa, 54 tons to India, 179 tons to Australia, 288 tons to New Zealand, 45 tons to Canada, 72 tons to British West Indies, 288 tons to other commonwealth countries, 136 tons to the Irish Republic, 108 tons to Sweden, 66 tons to Germany, 58 tons to the Netherlands, 76 tons to Belgium, 105 tons to France, 41 tons to Egypt, 10 tons to Iran, 54 tons to Brazil, 28 tons to Uruguay, six tons to Argentina, and 648 tons to other foreign countries.

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in ice plants
all over the world

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The little green tablets that make ice clearer!

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TEMPLETS give you a stronger ice cake that does not readily crack, break or chip. Because TEMPLET-treated ice is stronger, you can freeze it faster with lower brine temperatures, make more ice in the same cans.

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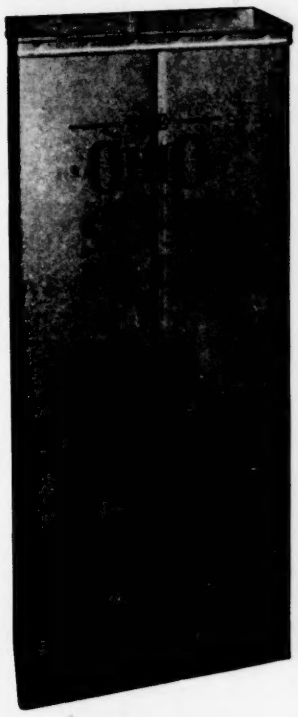

Welded Cans
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Industrial Trucks and Trailers

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Shipments of Air Conditioning and Commercial Refrigerating Equipment – 1951

SHIPMENTS of components and accessories for air-conditioning and commercial refrigeration equipment in 1951 were valued at $213 million, up 8 percent over 1950, according to the Bureau of the Census, Department of Commerce. Shipments of condensing units in 1951 totaled 840 thousand, valued at $76 million, representing no decline in value from the previous year but a drop of 46 thousand in number of units.

A total of 1,052,000 compressors and compressor units, valued at $57 million, were shipped in 1951. This represents increases of 10 percent in number of units and 21 percent in value compared with 1950. The value of heat-exchanger equipment shipped in 1951 amounted to $65 million, an increase of 6 percent over the previous year, and shipments of centrifugal refrigeration systems, at $15.3 million, showed a 25 percent gain over 1950.

Shipments of self-contained air-conditioning units totaled 282,488 valued at $94 million in 1951, up 10 percent and 8 percent, respectively over number of units and value in 1951.

SHIPMENTS OF COMPONENTS AND ACCESSORIES FOR AIR CONDITIONING AND COMMERCIAL REFRIGERATION
1947 - 1951

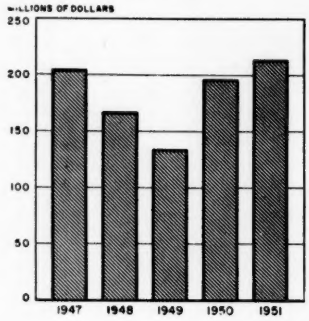


Table 1 presents an historical summary of the quantity and value of shipments of air-conditioning and commercial refrigeration equipment by class of product for the period 1947 through 1951. Other tables show the quantity and value of shipments of individual types of air-conditioning and commercial refrigeration equipment (except compressors and compressor units) for 1950 and 1951, also 1950 and 1951 data on quantity and value of shipments of compressor and compressor units, and number of compressor bodies manufactured, a compressor body being defined as the basic compressor casting.

The figures on quantity and value of shipments in this report represent completed sales of equipment, i. e., units actually billed and shipped. Complete units delivered on consignment or shipped to a branch warehouse for stock are not included until such time as they are actually sold. The dollar values shown are the manufacturers' net billing prices, f. o. b. factory.

This release presents data for all known companies manufacturing components and accessories for air-conditioning and commercial refrigeration and complete air-conditioning equipment of the types specified in this release. The 1951 figures are based on reports received from 133 companies on Census Form MA52A. This includes reports from 35 companies that were not canvassed in 1950.

TABLE 1—AIR-CONDITIONING EQUIPMENT AND COMPONENTS AND ACCESSORIES FOR AIR-CONDITIONING AND COMMERCIAL REFRIGERATION EQUIPMENT: QUANTITY AND VALUE OF SHIPMENTS, BY CLASS OF PRODUCT, 1947-1951
(Value figures in thousands of dollars)

Class of Product	1951		1950*		1949		1948		1947	
	Number	Value	Number	Value	Number	Value	Number	Value	Number	Value
Condensing units, total	840,176	$75,672	885,913	$75,833	610,341	$53,534	841,609	$73,443	1,039,772	$98,296
Ammonia refrigerants	240	404	245	352	254	346	1,129	1,799	1,646	2,107
Refrigerants except ammonia, total	839,936	75,268	885,668	75,481	610,087	53,188	840,480	71,644	973,093	90,224
Air-cooled	796,303	58,624	835,239	59,035	570,280	40,127	797,098	56,829	924,553	73,742
Water-cooled	43,633	16,644	50,429	16,446	39,807	13,061	43,382	14,815	48,540	16,482
Condensing units, not reported by type	.....	.....	.....	.....	.....	.....	.....	.....	65,033	5,965
Compressors and compressor units, total	1,051,937	56,669	954,368	46,977	604,431	29,929	459,390	33,493	n. a.	34,586
Ammonia refrigerants	2,401	6,465	2,652	6,756	2,240	5,620	4,156	9,209	4,415	9,481
Refrigerants except ammonia	1,049,536	50,204	951,716	40,221	602,191	24,309	455,234	24,284	313,682	20,148
Compressors and compressor units, not reported by type	.....	.....	.....	.....	.....	.....	.....	.....	n. a.	4,957
Heat-exchanger equipment, total	.....	65,077	.....	61,337	.....	40,925	.....	48,552	.....	63,025
Evaporative condensers	6,216	8,652	7,818	8,869	4,798	5,850	5,560	7,505	n. a.	7,875
Unit coolers, total	121,981	27,296	133,300	24,588	95,850	15,707	102,825	17,874	n. a.	20,167
Air-conditioning	33,263	14,636	29,704	11,671	30,044	7,997	21,633	8,276	n. a.	6,208
Refrigeration	88,718	12,660	103,596	12,917	65,806	7,710	81,192	9,598	n. a.	13,959
Other heat-exchanger equipment	.....	29,129	.....	27,880	.....	19,368	.....	23,173	.....	28,246
Heat-exchanger equipment, not reported by type	.....	.....	.....	.....	.....	.....	.....	.....	.....	6,737
Self-contained air-conditioning units, total	282,488	93,573	257,263	86,913	123,709	50,584	111,620	49,008	74,976	39,509
Window-sill type	228,964	42,442	187,224	31,373	78,454	14,425	(1)	(1)	(1)	(1)
Other than window-sill type	53,524	51,131	70,039	55,540	45,255	36,159	(1)	(1)	(1)	(1)
Other refrigeration and air-conditioning equipment, total	.....	36,537	.....	n. a.	.....	n. a.	.....	n. a.	.....	n. a.
Centrifugal refrigeration systems	441	15,300	382	12,249	285	8,189	361	10,351	313	7,814
Ice-making machines	12,998	8,804	14,914	8,907	6,902	4,641	5,947	5,266	7,822	3,122
Refrigeration chassis for air-conditioning. Year-round air conditioners (self-contained, except heat pumps)	.....	5,863	n. a.	n. a.	n. a.	n. a.	n. a.	n. a.	n. a.	n. a.
Mechanical dehumidifiers, refrigeration type	75,659	4,731	n. a.	n. a.	n. a.	n. a.	n. a.	n. a.	n. a.	n. a.
Absorption and adsorption systems and equipment	138	1,839	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)

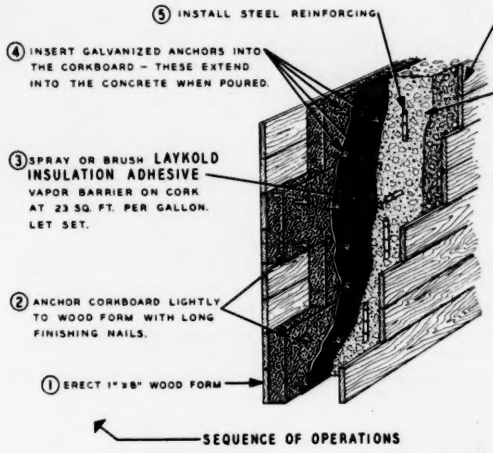
*Revised.
n. a. Not available.
1 Withheld to avoid disclosing figures of individual companies.

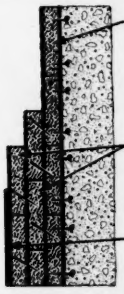
Laykold®

DATA SHEET
No. 4

How to ANCHOR CORK to a POURED CONCRETE WALL

Including Vapor Barrier


5 INSTALL STEEL REINFORCING
6 INSTALL OUTSIDE CONCRETE FORM. LINE UP FORMS AND CORKBOARD SO THAT TIE WIRES PASS BETWEEN BOARDS.
4 INSERT GALVANIZED ANCHORS INTO THE CORKBOARD – THESE EXTEND INTO THE CONCRETE WHEN POURED.
7 POUR CONCRETE WALL USING HYDROPEL INTEGRAL WATERPROOFING ADMIX.
3 SPRAY OR BRUSH LAYKOLD INSULATION ADHESIVE VAPOR BARRIER ON CORK AT 23 SQ. FT. PER GALLON. LET SET.
2 ANCHOR CORKBOARD LIGHTLY TO WOOD FORM WITH LONG FINISHING NAILS.
1 ERECT 1" x 8" WOOD FORM
SEQUENCE OF OPERATIONS


8 AFTER WOOD FORMS ARE REMOVED THE FIRST LAYER OF CORK REMAINS FIRMLY ANCHORED TO THE NEW WALL WITH ASPHALT VAPOR BARRIER IN PLACE.
9 ADDED LAYERS OF CORK ARE INSTALLED WITH LAYKOLD INSULATION ADHESIVE AND WOOD SKEWERS.
10 FINISH CORK WITH TROWEL APPLICATIONS OF LAYKOLD MASTIC WEATHERCOAT AND WEATHERCOAT.

CROSS SECTION (AFTER FORM REMOVAL)

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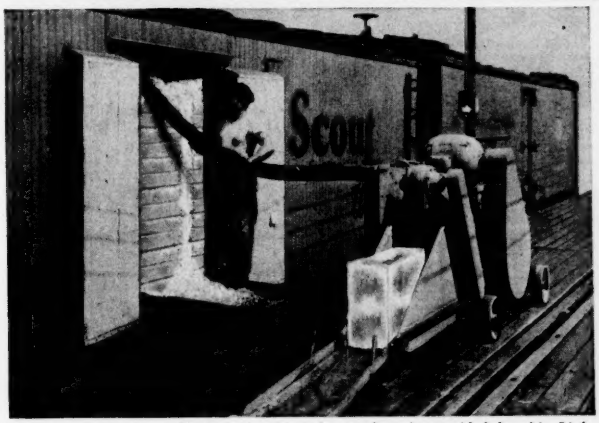
Snow-icing opens new markets for you



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LINK-BELT COMPANY: Chicago 8, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices in principal cities.

With a LINK-BELT Ice Crusher-Slinger you can give shippers the improved refrigeration they're demanding today

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Perishable items — produce, seafood, meat, bottled milk — reach market in better condition when top-iced with a Link-Belt Ice Crusher-Slinger.

There's a model for your exact needs. From 15 to 60 tons per hour capacity, stationary or portable, electric or gasoline powered. Find out about this money-maker today.

LINK-BELT

ICE CRUSHER-SLINGERS

12,591

Acrma Opposes Licensing of Contractors and Operators

THE licensing of contractors, journeyman mechanics, apprentices, and operators is opposed by the manufacturers of commercial and industrial refrigerating and air conditioning equipment, as a result of discussion at the annual meeting of the Air Conditioning and Refrigerating Machinery Association held at Hot Springs, Va. recently.

Review of the efforts of national and regional organizations of refrigeration contractors, servicemen, and others to have state and municipal legislation enacted requiring licensing of contractors, journeyman mechanics and apprentices, and equipment operators, resulted in the formal adoption of the following ACRMA policy statement:

"ACRMA believes that licensing of air conditioning and refrigeration contractors, journeyman mechanics and apprentices, and equipment operators is contrary to the best interests of the public and of the air conditioning and refrigeration industry.

"Licensing requirements provide a ready and convenient channel for abuses such as the limiting of competition by excessive fees, through unreasonable requirements, and through administration by examining boards and enforcement agencies which may be less than impartial. Excessive fees, unreasonable examination requirements, and similar features tend to limit free and competitive enterprise and create barriers to interstate and inter-community commerce.

"Licensing charges must be reflected in higher over-all costs of air conditioning and refrigeration installations to the buyer, without any commensurate return to the public in the form of quality of equipment, proper installation, and safe operation of air conditioning and refrigeration installation."

New Venezuelan Meat Plant Proposed

THE Central Government of Venezuela and municipal authorities of Valencia are considering proposals for the construction of a modern abattoir, freezing plant and by-product processing plant at Valencia. Plant and equipment from overseas will be needed if plans are approved.

CONVENTION CALENDAR

NATIONAL FOOD DISTRIBUTORS ASSOCIATION

August 11-14, 1952
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CANADIAN ASSOCIATION OF ICE INDUSTRIES

October 21-22, 1952
Chantecler Hotel, Ste, Adele, Que.
MRS. MILDRED CROFT, Secretary

NATIONAL ASSOCIATION OF ICE INDUSTRIES

November 11-14, 1952
Netherland Plaza Hotel, Cincinnati
GUY W. JACOBS, Exec-secy.

NATIONAL ASSOCIATION PRACTICAL REFRIGERATING ENGINEERS

November 12-14, 1952
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ASSOCIATION DIRECTORY

AMERICAN INSTITUTE OF REFRIGERATION
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Model G-100

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- **For Immediate Delivery** from dealers and warehouse stocks in principal cities.
- **For Quality**—SOLVAY CALCIUM CHLORIDE flows easier, requires less pumping; it allows safe operation at low temperatures, permits quicker freezing.
- **For Economy**—SOLVAY CALCIUM CHLORIDE provides a "long-life" brine that costs less in the long run. It assures maximum life of your equipment and reduces the possibility of costly shut-downs and repairs.
- **For Technical Service**—SOLVAY TECHNICAL SERVICE is available without charge to help with your brine problems.

MAIL COUPON for Free Brine Maintenance Chart . . . prices and location of nearest stock . . . and information on the preparation, strengthening and maintenance of Calcium Chloride Refrigeration Brine.

SOLVAY Calcium Chloride

SOLVAY PROCESS DIVISION, Allied Chemical & Dye Corp.
61 Broadway, New York 6, N. Y.

Please send me, without any cost or obligation, your free Brine Maintenance Chart . . . prices and location of nearest stock . . . and information on the preparation, strengthening and maintenance of Calcium Chloride Refrigeration Brine.

Name_____

Company_____

Address_____

City_____ Zone_____ State_____

56-8

DEATHS

Fred J. Fink

THE death of Fred J. Fink, 74, long time treasurer and general manager of the Tulsa Ice Company, Tulsa, Okla., occurred July 9 at his home in Tulsa, after a three-year illness. A native of Marshall, Mo., Mr. Fink came to Tulsa in 1902 and became general manager and treasurer when the company was organized. He saw it grow from a 7-ton daily capacity to a 265-ton capacity at two large plants. Ill health compelled him to retire three years ago.

Mr. Fink was active in public affairs throughout his active business years. He was the oldest member of the Elks lodge in Tulsa and a member of the Presbyterian church. He was Oklahoma Association of Ice Indusa past president and director of the tries and a former member of the Tulsa Chamber of Commerce. Surviving are his widow, Mrs. Alice Fink, two brothers and a sister.

The Tulsa Ice Company discontinued operations last February when it was sold to Kenneth Addison, a co-owner of the Independent Ice & Refrigeration Company, and Charles English, Shawnee, owner of the Denver Ice Company in Tulsa.

Alvin M. Forsyth

THE death of Alvin M. Forsyth, West Homestead, Pa., president of the Homestead Ice Corp., and head of numerous other business organizations occurred June 7. Mr. Forsyth came to Homestead while very young and was with the ice company for many years, first as an employee and later as president.

He was a member of the First Presbyterian church, F & A M, Pennsylvania Concistory, Syria Temple, Homestead Rotary, the Elks and other organizations. Survivors include his widow, Mrs. Sylvia Forsyth, a daughter, Mrs. Robert Ricketts of Oil City, and a son Albert M. Forsyth, Pittsburgh.

R. T. CALLAWAY, superintendent of of the Harlingen Ice Company, Harlingen, Texas, died in a Dallas hospital, June 13. He was 50. Mr. Callaway had been a resident of Harlingen since 1921, moving there from Perrin. He had been with the ice company for the past 18 years.

TORLEIF P. JOHANNESSEN, 67, for many years a refrigeration engineer for The President Lines, of the West Coast, and for the past six years with the University of Washington, at Seattle, died at his Seattle home from a heart attack. Born in Manistee, Mich., he came to Seattle 25 years ago.

Charles H. Free

THE death of Charles H. Free, Shreveport, La., engineer and ice industry executive for many years, occurred on May 30 of a heart attack in Shreveport, where he was associated with his son, Walter Free, as Frick representative and licensed engineers.

SAMUEL DECHERNEY, retired ice and coal dealer, Philadelphia, Pa., died June 15 at the age of 76 years. He had operated his business for 25 years before retiring in 1944.

WILLIAM R. ESSEX, formerly an ice dealer and partner in the firm of Nelson & Essex, Providence, R. I., died suddenly at the Kent County Hospital, Warwick. He was 71.

JAMES C. HARROLD, 51, president of the Harrold Ice Company, Fort Worth, Texas, died July 5 in an airplane that was flying him to a Colorado Springs specialist. Mr. Harrold was stricken as the plane approached Memphis, Tex.

DR. S. HORACE SCOTT, president of the Atlantic Ice Company, Coatesville, Pa., died July 13 at the age of 87. Dr. Scott was a physician and president of the school board for 44 years, chief of staff at the Coatesville hospital from 1912 to 1946 and a director of the National Bank of Chester Valley. He is survived by two daughters.

Cause and Control of Rome Spot in Apples

THE CAUSE and control of Rome Spot, a troublesome disorder of several varieties of apples in storage, is announced by Clarence E. Baker and E. C. Maxie of Purdue University, a result of a T.R.R.F.-aided study, project No. 29. This study is an extensive investigation of atmosphere control, air purification and air conditioning and their effects on fruits, vegetables, eggs, meats, etc.

Dr. Baker and Mr. Maxie have shown that this disorder is caused largely by volatile chemical compounds given off by apples during normal respiration. When they accumulate in the atmosphere in close proximity to the fruit, dark brown or black spots frequently form about the lenticels or breathing pores in the skins of apples. In commercial tests, absorption by oiled paper wraps, by shredded oiled paper, or air purification with activated charcoal filters, retarded the disorder during storage and following removal from storage to higher temperature. Combinations or air purification and oiled paper were most effective.

While this trouble sometimes develops on "old fashioned" Rome Beauty apples, it is much more serious on some of the red sports of Rome, such as Red Rome and Gallia. In many years, the financial loss from Rome Spot on stored apples is serious and widespread.

New Plants and Improvements

Toronto, Ont., Canada—A new refrigeration and storage plant has been constructed here by Higgins & Burke, Ltd., food distributors. The one-story plant has 2,000 square feet for storage of frozen foods.

Augusta, Ga.—A new ice cream storage plant has been constructed by Southern Dairies, 90 x 40 feet, with two hardening rooms. Freon refrigerating equipment is used.

Warrensburg, Mo.—The City Ice & Coal Co. has completed a new storage building and installed an ice vending machine where 24-hour service will be available.

Grants, N. M.—The Grants Ice & Development Co., headed by Mark J. Fields, has built a $250,000 ice plant to provide ice for vegetables.

Newburgh, N. Y.—The Larkin Ice & Cold Storage Corporation is building a new one half million pound frozen food facility here. When completed, it will be the largest frozen food storage plant in the Hudson Valley.

Bremerton, Wash.—A new cold storage addition about 19 x 23 ft. is to be added to the hospital in the U. S. Navy Yard on Puget Sound.

Chelan, Wash—The Chelan Apple Company is building a 60 by 150 addition to the present warehouse. The new structure will be of concrete block, to be used for common storage of apples, and will be convertible to cold storage.

Sales and Reorganizations

New Albany, Ind.—The ice and cold storage plant of the National Ice & Products Co. has been purchased by the Floyd County Beverage Co. The new owners plan to discontinue the manufacture of ice. The locker plant was not sold and will continue under the same management and corporate name.

Vandalia, Mo.—The Vandalia Ice Co. has been sold by Cottle Ogden to David Burnett effective July 1. The new owner also has a soft drink business.

Arrington, Va.—The Arrington Cold Storage Cooperative has purchased a branch plant at Shipman of the Inland Service Corporation. The consideration was $62,000.

Fire and Accident Record

Helena, Ark.—Fire damaged an office and small storeroom of the Helena Ice Delivery here.

Canadian Dry Ice Plant

AMONG important industrial developments during 1951 in Manitoba, Canada, has been a new carbonic and dry ice plant. A number of manufacturers in the Province have announced plans for future expansion and development.

ICE SUPPLIES

- PAPER BAGS
- CANVAS BAGS
- ICE PICKS
- ICE TONGS
- TANK SUPPLIES

EQUIPMENT

- SHAVERS
- CRUSHERS*
- CRUSHER-SLINGERS
- SCORERS

**Stainless Steel Crusher Housing (Optional)*

"Complete line of Tools and Supplies for the Ice Industry"

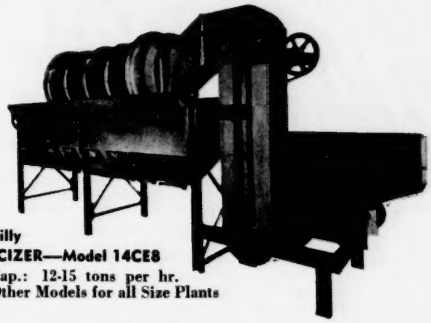
Write for

NEW - 1952
CATALOG & PRICE LIST

Prompt Shipment on all Your Needs

MORE PROFIT IN ICE

–When Sized by a Lilly ICIZER



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ICIZER—Model 14CE8
Cap.: 12-15 tons per hr.
Other Models for all Size Plants

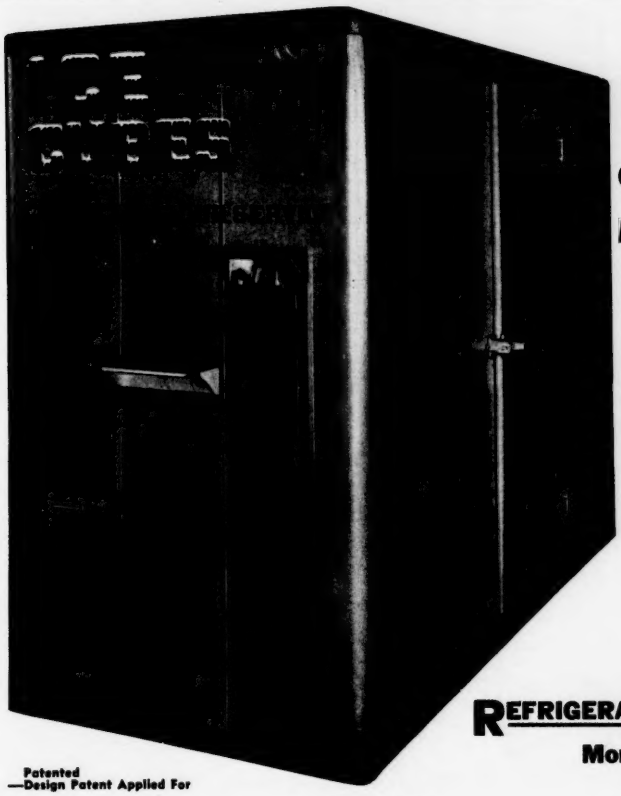
Ice—*properly sized*—brings premium prices—more dollar profit. It brings additional sales and profits the year 'round. The new engineering features in Lilly ICIZERS and CRUSHERS—*Stainless Steel Breaker Housing (Optional), reduced drum speed, etc.*,—give you even more economical and better controlled production.

THE LILLY COMPANY
466 Union Avenue Memphis 1, Tenn.

Write *today* for complete information and prices on—

Lilly ICIZERS and CRUSHERS

Ask for Catalog No. 302



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The NEW POLAR

CUBED and CRUSHED ICE VENDING STATION

Belt Capacity–

50 ten-pound bags

Storage for 200

ten-pound bags.

Write today for Free Literature

REFRIGERATION ENGINEERING CO.
Montgomery, Minnesota

What's New

MACHINERY
APPLIANCES • PROCESSES

New Sicromatic Charts Speed Up Coil Selection

A NEW "Sicromatic" Chart and a special "Sicromatic" rule used with the chart are being offered to architects, designers, engineers and contractors by the Marlo Coil Company of St. Louis. Developed for the selection of coils for air conditioning applications using water or direct expansion refrigeration, the new Chart-Rule Combination permits instant determinations of coil face area, air velocities, number of tube rows, required dry bulb depression, wet bulb depression and water velocity feet per second. The new Chart-Rule technique, it is claimed, does away with all assumptions, with no interpretations from previously inadequate methods being required, eliminating expensive, time-consuming calculations.

Copies of this Sicromatic Chart along with the Sicromatic Rule plus instructions on the simple technique used may be obtained by writing Marlo Coil Company, 6135 Manchester, St. Louis, Mo.

Activated Carbon For Air Purification

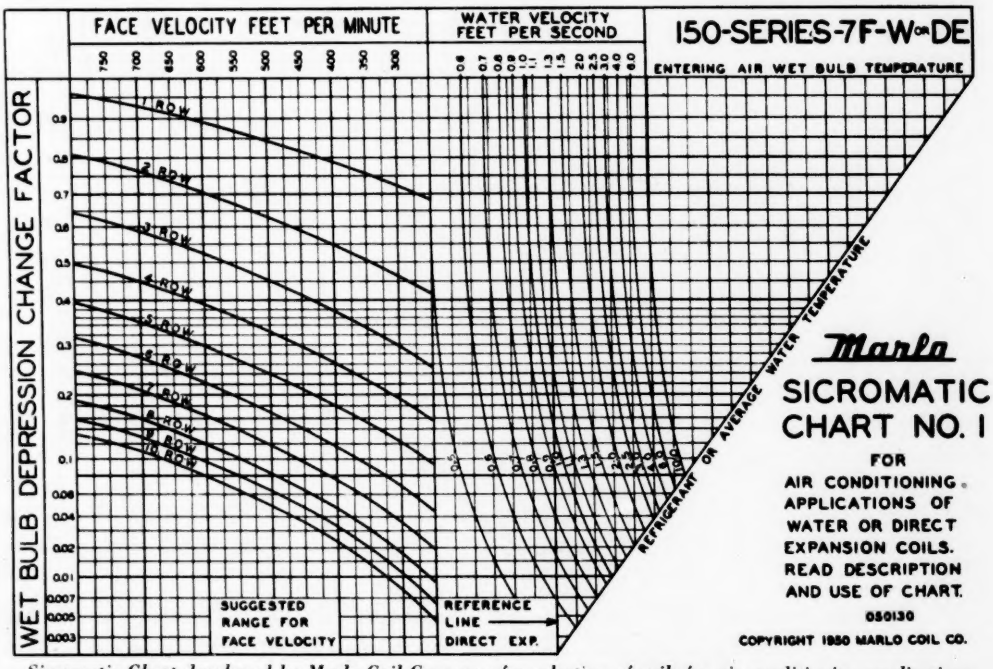
A NEW line of "activated carbon" equipment for air recovery and air purification has been announced by the Aerotrol Engineering Corp., Pittsburgh, Pa. Already being marketed under the trade name "Nu-Air," the equipment performs the basic function of removing odors from air and gases by means of adsorption of the odors by specially prepared activated carbon. The equipment is available in canisters or panels in standard designs or special designs for special applications.

The basic material is the same as that used in military gas masks in the two world wars.

Aerotrol Engineering Corp. will provide numerous services in connection with activated carbon uses, in addition to manufacturing the equipment itself. The organization will survey the operations and problems of interested firms to determine how Nu-Air activated carbon equipment may accomplish specific tasks, and at what cost. Aerotrol will also provide a "reactivation" service for all types and makes of activated carbon installations.

New Styrofoam Reduces Burning Characteristics

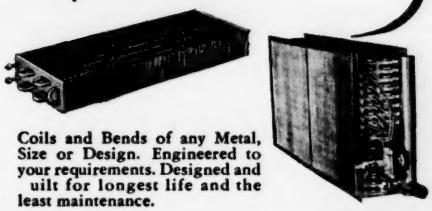
A NEW formulation of Styrofoam with reduced burning characteristics has been developed by the Dow Chemical Company, which meets American Society for Testing Materials requirements for a "self extinguishing" plastic. It is designated as "Styrofoam 33." For purposes of identification, the new formulation will be tinted a blue color. It was originally developed as a buoyancy medium for life rafts and rescue equipment during World War II. The material was later improved for low-temperature insulation for cold storage plants, household refrigerators, home insulation, and industrial equipment and pipe covering.



Sicromatic Chart developed by Marlo Coil Company for selection of coils for air conditioning applications

REMPE

Pipe Coils
Fin Coils
***For* Refrigeration, Air Conditioning, Heating**



Coils and Bends of any Metal, Size or Design. Engineered to your requirements. Designed and built for longest life and the least maintenance.

Send your problems to us for engineering assistance.

REMPE CO. HEAT TRANSFER EQUIPMENT

REMPE COMPANY

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MODERN REFRIGERATION

This official organ of the British Refrigerating Industry incorporates the two original British Journals *"Cold Storage & Produce Review"* and *"Ice & Cold Storage"*. Now in its 54th year. *"M.R."* gives the latest reliable technical and practical information.

Subscription, post free ..... $4.00 a year

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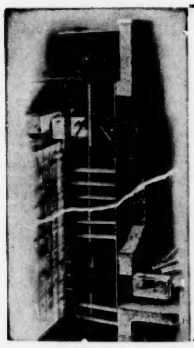

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Double Gig Ice Hoist
Fast - Sturdy - Dependable -

Send for details

THE CAPITAL ELEVATOR & MFG. CO.
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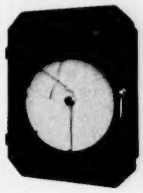
Columbus 8, Ohio

Meet 3 old favorites

TAYLOR instruments like these have been doing an outstanding job of measuring and controlling various refrigeration processes for years. Today they are as efficient and as much in demand as ever. *Instruments for indicating, recording and controlling temperature, pressure, flow, liquid level, speed, density, load and humidity.*



TAYLOR RECORDING THERMOMETER

For brine tanks, brine and ammonia lines, bunker rooms, or any process in refrigeration where temperature record is required. Available to record in one, two or three different temperatures.

TAYLOR SELF-ACTING CONTROLLER

For the control of apparatus where temperature of cooling medium is not lower than 10°F. Simple, easy to use, inexpensive. Reacts quickly to changes in temperatures. Requires no auxiliary air pressure. Valve sizes ½" to 2".

TAYLOR INDUSTRIAL THERMOMETER

For installation in insulated lines. New, one-piece, shallower case for wider angle of vision. Triple lens BINOC* tubing and bold, contrasting scale make this the easiest to read of all industrial thermometers. Straight or 90° angle stems. Many other types, ranges and angles.

• • •

TAYLOR'S CATALOG FOR REFRIGERATION INDUSTRY

Write today for Taylor's Catalog for Refrigeration, No. 300 Jr. giving details on how these instruments, and many more, can cut costs, give new efficiency on refrigeration problems. Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada.

*Reg. U. S. Pat. Off.

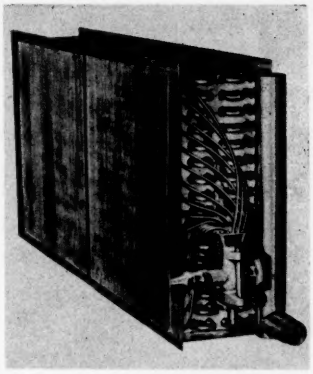
Taylor Instruments
MEAN
ACCURACY FIRST
IN HOME AND INDUSTRY

New Cargo Basket

A NEW wire cargotainer and pallet has been developed by the Pittsburgh Steel Products Company, designed to meet handling, loading and storage problems. They are built of cold-drawn steel wire (2 in. mesh with approximately ¼ in. wire each way) in 2,000 and 4,000 pound capacitors in standard sizes. Each has an 8-way entry making them readily accessible while stacking and in use. They can be folded and stored, or shipped in small space. Other advantages are their light weight, strength and adaptability.

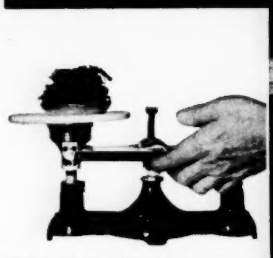
Rempe Announces New Line of Air Cooling Coils

A NEW line of air cooling coils is announced by the Rempe Co., Chicago, Ill., designed for use with 45 F. suction and suitable for use with Freon-12 and Methyl Chloride. Coils are built with ⅝ inch copper tubes with seven aluminum fins per inch. Fins have ⅛ inch collars and are fully expanded to coil tubes. Tested under 350 lbs. pressure, dehydrated and sealed. Casings are heavy gauge galvanized steel. Coils are furnished complete with Multi-Outlet Expansion Valves made-on, and are ready to install.

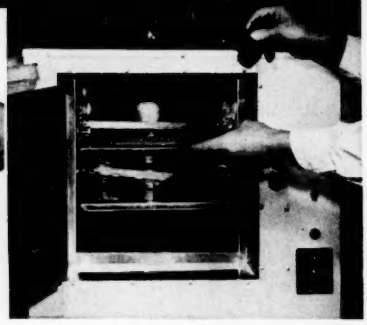


New Rempe Air Cooling Coil

In-place field tests show
DECREASING MOISTURE CONTENT



Weight of Palco Wool is checked before and after oven drying to determine accurately the moisture content.



Palco Wool Insulation removed from measured space in refrigerator wall is placed in glass jar and hermetically sealed for transportation to laboratory.

...of PALCO INSULATION WOOL in actual use

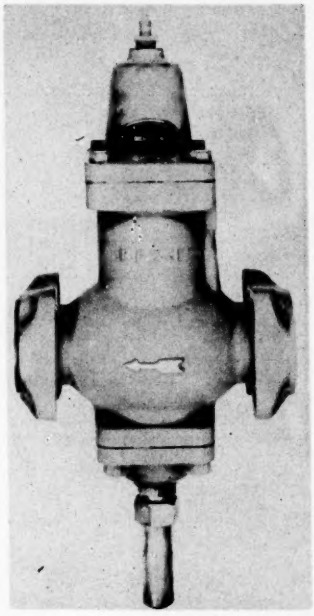
Extensive in-place field tests by impartial scientific refrigerating engineers have shown that moisture content of Palco Wool Insulation actually decreases over extended periods of use. Normal moisture content of Palco Wool when shipped averages 15%. Samples taken from the center of wall cavity in typical refrigerator walls ranged from 8.18% to 12.45%. This is due to Palco Wool's ability to permit free travel of moisture toward the cold side, resulting in continuous maximum insulating efficiency. For complete results of these important field tests, request Technical File No. IR-4

CERTIFIED INSULATION

THE PACIFIC LUMBER COMPANY
100 BUSH STREET, SAN FRANCISCO 4, CALIFORNIA
35 EAST WACKER DRIVE, CHICAGO 1, ILLINOIS

New Line of Evaporator Pressure Controls

OF IMPORTANCE to dairies, packing plants, bottling plants, cold storage warehouses, and other plants, where unvarying temperatures must be maintained, is a line of Wolf-Linde evaporator pressure controls designed and built by Dersch, Gesswein &



Wolf-Linde evaporator pressure control.

Neuert, Inc. These valves which are made in part sizes, ranging from ¾ through 6 inches, automatically adjust to provide predetermined evaporator pressure obviating constant manual adjusting. They are made for all refrigerants.

DIMCO CAST ALUMINUM FIN EVAPORATING COIL

★ *Saves Space*

★ *Saves Weight*

★ *Saves Cost*

CAN BE USED WITH ANY REFRIGERANT

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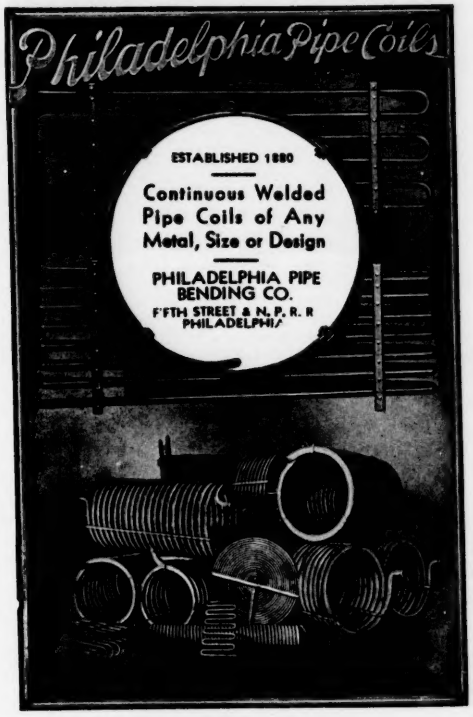
DETROIT ICE MACHINE COMPANY

2615 Twelfth St., Detroit 16, Mich.

DIMCO Evaporators in a Frozen Food Storage Room at Great Lakes Terminal Warehouse, Toledo, Ohio. A typical installation facilitating palletizing.


Philadelphia Pipe Coils
ESTABLISHED 1880
Continuous Welded Pipe Coils of Any Metal, Size or Design
PHILADELPHIA PIPE BENDING CO.
FIFTH STREET & N. P. R. R
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REFRIGERANT

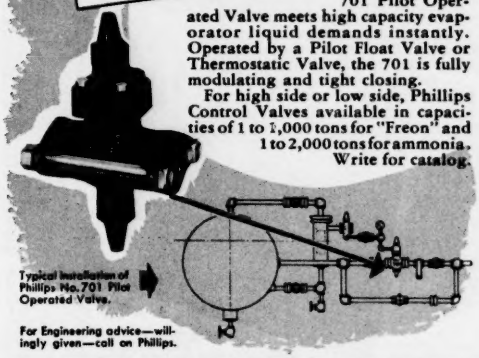
SUPPLY MEETS DEMANDS... *Automatically*

with **PHILLIPS** FLOAT CONTROLS

PILOT OPERATED LIQUID CONTROL VALVES

The Phillips No. 701 Pilot Operated Valve meets high capacity evaporator liquid demands instantly. Operated by a Pilot Float Valve or Thermostatic Valve, the 701 is fully modulating and tight closing.

For high side or low side, Phillips Control Valves available in capacities of 1 to 1,000 tons for "Freon" and 1 to 2,000 tons for ammonia. Write for catalog.



Typical installation of Phillips No. 701 Pilot Operated Valve.

For Engineering advice—willingly given—call on Phillips.

H. A. PHILLIPS & CO. REFRIGERATION CONTROL SYSTEMS DESIGNERS AND ENGINEERS

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MODEL W-90-M

ADJUSTABLE GRATE—For TRUCK MOUNTING

LITTLE GIANT

ICE BREAKERS

● *SAVE TIME*

● *SAVE LABOR*

● *SAVE ICE*

11 MODELS TO CHOOSE FROM

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MICRON, INC., Dept. I

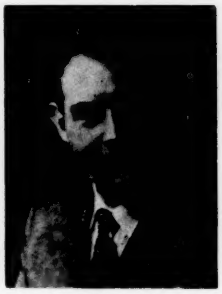
BETTENDORF, IOWA

MANUFACTURERS' NEWS

Union Bag Announces Change in Salesmen

THE Union Bag & Paper Corporation, New York City, announces the following changes in the company's sales organization:

Harold Carlson, formerly of the New York sales office, will supervise Flexible Packaging sales in Maryland, Delaware, Virginia, West Virginia and North Carolina. He will have headquarters in the company's Baltimore office.



Harold Carlson

Jack Bostian

Jack Bostian, formerly of the New York office, will be the Flexible Packaging sales representative for the states of South Carolina, Georgia, Florida and Alabama. He will operate out of Jacksonville, Fla.

Mercer Joins Acme as Director of Merchandising

THE recent appointment of R. E. Mercer as Director of Merchandise announced by Acme Industries, Jackson, Mich. Mr. Mercer is a member of the American Society of Refrigeration Engineers and has long been identified with the air conditioning and refrigeration industry, serving in various sales and executive capacities.

R. E. Mercer

Prior to his association with Acme, he was national sales manager for the Kalamazoo Stove and Furnace Company. As director of merchandising he will direct all sales activities and will formulate a merchandising and sales promotional program for Acme's three sales divisions; original equipment manufacturing sales; air conditioning and refrigeration sales ;and its Flow-Cold sales divisions.

DANDUX QUALITY PRODUCTS FOR THE ICE INDUSTRY

INSULATED COVERS— No shifting, no wadding, 20 sizes

METAL BOTTOM ICE BAGS— Stiffer, stronger, easier to use.

TARPS— Seams double sewn, reinforced eyelets.

DANDUX

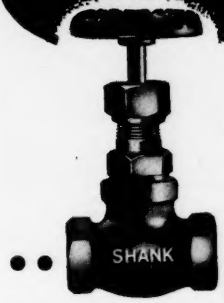
C. R. DANIELS INC., Daniels, Md.

Insulated Ice Cover

2109 Commerce St., Dallas 1, Texas 549 W. Randolph St., Chicago 6, Ill. 121 E. Third St., Charlotte 2, N. C.

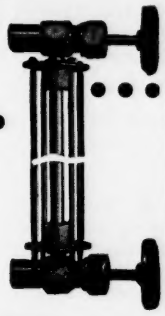
SHANK REFRIGERATION PRODUCTS

ALWAYS DEPENDABLE!



SEMI-STEEL SHUT-OFF VALVE

Highest grade non-porous metal—full size ports—clean cut threads. Back seated stem — Shank design base—perfect alignment. Long life packing ring.



ALL-STEEL GAUGE SETS

All-Steel Construction. Automatic shut-off of liquid in case of glass breakage. Composition packing rings give long life, no-leak seal.

If your jobber doesn't stock—write

CYRUS SHANK CO.

629 W. Jackson Blvd. Chicago 6, Ill.

THESE ELECTRONIC FINGERS CONTROL ICE THICKNESS

How thick do you keep the ice in your Ice Builder Milk Cooler? Whatever it is, you can control it automatically — to exact preset measurements and temperature with

Lumenite Electronic

ICE THICKNESS CONTROL

Maintains exact amount of ice: Keeping water content at constant temperature regardless of air conditions.

- No Thermostats
- No Moving Parts
- No Adjustments
- Most Effective Refrigeration
- Ice Controlled at Source
- Never Forgets
- Saves Power

If you use — or plan on an ice builder cooler — get our technical Bulletin IC51.

LUMENITE ELECTRONIC CO.

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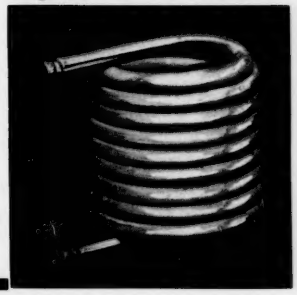
BENDS, COILS, SYSTEMS—to Your Specifications

Hard-to-make Bends, Special Coils, Intricate Systems—all these are yours promptly and economically when you place your orders with CHICAGO NIPPLE.

Submit drawing or B/P for estimate.



CHICAGO NIPPLE MFG. COMPANY

1997 CLYBOURN AVE., CHICAGO 14, ILL.

CATALOGS AND BULLETINS

Diaphragm Control Valve Revised Description

THE publication of a revised edition of the Diaphragm Control Valve Section of their BS&B Climax Control Equipment Catalog is announced by Black, Sivalls & Bryson, Inc. This section, number 105, shows photographs, sectional drawings and face-to-face dimensions of the new or completely redesigned items.

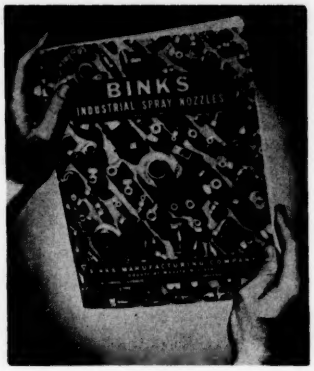
Completely new is the Type 87 Diaphragm Control Valve with bellows sealed stem. This valve is offered for use in industries where even slight leakage of flowing medium might become obnoxious, dangerous or excessively expensive.

Another new item is the 115 expanded Outlet Diaphragm Control Valve. It has been especially designed to provide a valve controlling flow of gases that require greatly increased volume upon release of pressure or liquids that are subject to a degree of flashing which would render an expanded outlet necessary.

Section 105, covering these and other items, will be furnished free upon request. Address Black, Sivalls & Bryson, Inc., advertising and sales promotion department, 7500 E. 12th street, Kansas City, Mo.

Binks Issues Bulletin on Industrial Spray Nozzles

ANYONE responsible for the specification of spray nozzles for air conditioning, refrigeration, heating and ventilating or similar heat transfer processes will find a wealth of information in a new 40-page Industrial Nozzle Bulletin published by the Binks Manufacturing Company of Chicago.



It fully describes industrial spray nozzles for a broad range of commercial and industrial processes. Data given include nozzle dimensions, capacities and spray angles. All nozzles are illustrated and in many cases cutaway drawings showing the construction and operation are included. "Blue print" drawings show proper installation details where this information is required.

The bulletin has a unique and very handy index that lists 29 different applications for industrial spray nozzles with page references for each. By using this index full information on nozzles for any specific process can be quickly and easily found. Copies will be mailed free by Binks Mfg. Co., 3122 Carroll Ave., Chicago 12, Ill.

Bulletin on Armstrong Refrigerant Purger

A NEW 4-page bulletin describing its No. 370 forged steel purger for venting air and other non-condensable gases from refrigerating systems has been issued by Armstrong Machine Works, Three Rivers, Mich. The bulletin describes the air problem, explains how the purger operates and gives physical data and list price. Also included are reports from users describing benefits obtained. The purger is described as being suitable for use with all common refrigerants. Copies are available upon request.

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to make worn compressors operate like new!

It is a matter of record that every time an ordinary compressor valve is replaced with a specially designed VOSS valve, the immediate result is increased efficiency and greater output . . . and this record covers thousands of installations, as reports testify.

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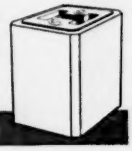

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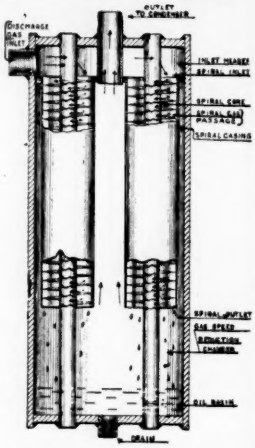

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Martocello & Co., Jos. A., Philadelphia, Penna.
Roots-Connersville Blower Corp., Connersville, Ind.

PRESSURE REGULATORS
Taylor Instrument Cos., Rochester, N. Y.

PROPELLERS AND ROTARY PUMPS
Martocello & Co., Jos. A., Philadelphia, Penna.

PUMPING MACHINERY
Aurora Pump Co., Aurora, Ill.
Layne & Bowler, Inc., Memphis, Tenn.
Roots-Connersville Blower Corp., Connersville, Ind.

PUMPING MACHINERY—AIR LIFT
Roots-Connersville Blower Corp., Connersville, Ind.

PUMPS, AMMONIA AND BRINE
Frick Company, Waynesboro, Pa.
Roots-Connersville Blower Corp., Connersville, Ind.
Vogt Machine Co., Henry, Louisville, Ky.

DIRECTORY

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Roots-Connersville Blower Corp., Connersville, Ind.

PURGERS
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Frick Company, Waynesboro, Pa.
Rex Engineering & Sales Co., Oklahoma City, Okla.

RAW WATER FREEZING SYSTEMS
Frick Co., Waynesboro, Pa.
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Vogt Machine Co., Henry, Louisville, Ky.

REBOILERS
Frick Company, Waynesboro, Pa.
Vogt Machine Co., Henry, Louisville, Ky.

RECORDING THERMOMETERS
Taylor Instrument Cos., Rochester, N. Y.

REFRIGERATED ICE STATIONS
Refrigeration Engineering Co., Montgomery, Minn.
S & S Vending Machine Co., San Jose, Calif.

REFRIGERATING AND ICE MAKING MACHINERY
(See Ice Making and Refrigerating Machinery)

RUST PREVENTATIVES
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Wright Chemical Corp., Chicago, Ill.

SCORING MACHINES
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Gifford-Wood Co., Hudson, N. Y.
Lilly Co., The, Memphis, Tenn.
Perfection Ice Scoring Machine Co., Fort Worth, Texas

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Lilly Co., The, Memphis, Tenn.
Vivian Mfg. Co., St. Louis, Mo.

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Martocello & Co., Jos. A., Philadelphia, Penna.

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Martocello & Co., Jos. A. Philadelphia, Pa.

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Vivian Mfg. Co., St. Louis, Mo.

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Taylor Instrument Companies, Rochester, New York

THERMOMETERS, RECORDING
Taylor Instrument Cos., Rochester, N. Y.

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Frick Company, Waynesboro, Pa.
Henry Valve Co., Chicago, Ill.
Kehoe Machinery Co., Inc., R. P., West Englewood, N. J.
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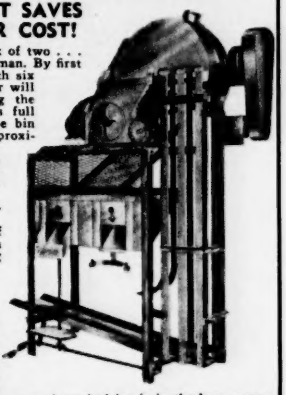
WELL SCREENS
Layne & Bowler, Inc., Memphis, Tenn.

WROUGHT IRON PIPE
Byers Co., A. M., Pittsburgh, Pa.

Bateman Automatic LOADER CRUSHER

CRUSHER ICE UNIT SAVES TIME AND LABOR COST!



One man can do the work of two . . . loader acting as the second man. By first loading the hopper slide with six 50-lb. blocks of ice, operator will not have to bother loading the crusher and can devote his full time to bagging ice. Storage bin under crusher will hold approximately 100-lbs. of ice.

ELEVATOR: Is so timed as to allow each block of ice to be crushed before the next block enters crusher. Crusher is set to grind 175-lbs. a minute.

BAG HOLDER: A half ring holds the top of bag in place while bottom of bag sits on floor or platform.

FOOT-OPERATED DOOR FOR LOADER CRUSHER
Operator can fill paper bags at a very fast rate for each magazine of ice used. Operator holds bag with both hands, pushing down on foot lever will open the chute allowing the ice to flow into the bag. When the proper amount of crushed ice is in the bag, operator removes foot from pedal cutting the flow of ice off. The operator while he has the bag in this position can tie the bag while the bin is being filled for another bag. Elevator can be stopped at any time to allow the operator more time if needed.

LOADER CRUSHER $715.00
(¾ h.p. motor at prevailing price)
F.O.B. Mineral Wells, Texas.

Bateman Write For Details **Mineral Wells, Texas**
Ice Processing Equipment

TRAFFIC NEVER STOPS

***when you repair your floors with* PERMAMIX**

Easy to apply—sets instantly—long wearing for year around use indoors or out—WILL NOT FREEZE—can be stored indefinitely and used in any temperature—lowers maintenance costs amazingly.

Here's all you do: Clean hole in any type floor, spread primer supplied in drum, fill in with PERMAMIX, tamp and dust with cement or floor dust, resume traffic immediately. It's that easy, for PERMAMIX feather edges and no cutting or chipping is required. No skilled labor is necessary, you need no special equipment, you have no mixing, waiting or production delays when you repair or patch your floors the easy, fast PERMAMIX way. Comes in handy, durable 50 lb. net weight drums.

NOW AVAILABLE! The new PERMAMIX-C for patching in low temperatures from 5° above zero to -30° below.

PERMAMix *Write or call for full details.*

PERMAMIX CORPORATION
220 N. La Salle St. Cent. 6-1785 Chicago 1, Illinois

FOR SALE IN SOUTHERN CALIFORNIA COMPLETE ICE PLANTS AT ATTRACTIVE PRICES:-

1616—Cans 11″ x 22″ x 52″ in 12 can baskets.
1—Arctic — Duplex Compressor H.D.A. 12″ x 18″ powered by 200 HP Electric Machinery Co. Synchronous Motor.
1—Vilter Duplex H.D.A. Compressor 12½ x 24″ powered by 250 HP Ideal Synchronous Motor.
Was operated to July, 1952—Fine Condition.

1008—Cans 11″ x 22″ x 52″ in 24 can baskets.
2—10″ x 10″ and 1—7″ x 7″ Worthington Vertical Twin Cylinder Compressors powered by Minneapolis Machinery Co. Synchronous motors.
Was operated to July, 1952—Built new in 1947. An exceptionally fine modern plant.

432—Cans 11″ x 22″ x 48″—in 4 can baskets.
1—9″ x 9″ and 1—10″ x 10″ and 1—6″ x 6″ York Vertical Twin Cylinder Compressors.
Is in very good condition.

432—Cans 11″ x 22″ x 48″—in 4 can baskets.
1—9″ x 9″ York Vertical Twin Cylinder Compressor.
In good condition.

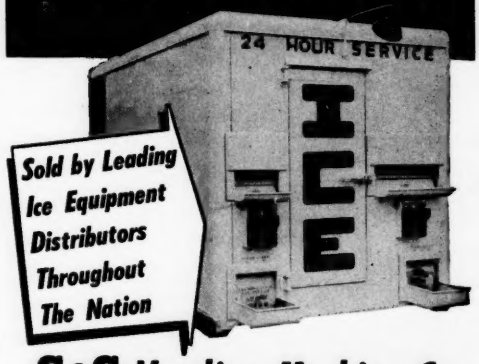
784—Cans 11½″ x 22½″ x 44″—Individual Cans—4 can lift.
1—9¼″ x 9¼″ Baker Vertical Twin Cylinder Compressor.
1—6″ x 6″ York Vertical Twin Cylinder Compressor.
1—9″ x 18″ Vilter Compressor—H.D.A.
Fair Condition.
Land and Buildings at each location may be purchased also, if desired.
For further information, write:

P.O. Box No. 2012
Terminal Annex
Los Angeles 54
California

SERVING THE ICE INDUSTRY FOR 20 YEARS

Dependable . . Automatic . . Refrigerated

S&S ICE VENDING STATIONS AND ICE VENDING EQUIPMENT



Sold by Leading Ice Equipment Distributors Throughout The Nation

S&S Vending Machine Co.
670 LINCOLN AVE., SAN JOSE, CALIFORNIA

USED ICE MACHINES & EQUIPMENT

- COMPRESSORS—3x3 to 12x12
- COMPRESSORS—with or without MOTORS
- COMPRESSORS—Diesel or Steam driven
- COMPLETE ICE PLANTS—15 to 50 Tons
- CONDENSERS—TRAVELING CRANES—PIPE — ICE CANS — NEW and USED

See Our Monthly Specials in the Classified Columns

Write or call for complete list of new and reconditioned ice making equipment.

ROBERT P. KEHOE MACHINERY CO., INC.
278 W. Englewood Ave. West Englewood, N. J.
TEaneck 7-3916

BLOWERS WITH R-C

Send for Bulletin R-C 1247 without obligation

For year-round satisfaction, blowers must deliver positive Volume at required Pressure and Low power cost. Performance of R-C Rotary Positive Blowers has been proved for many years in large and small plants.

ROOTS-CONNERSVILLE BLOWER DIVISION
525 Columbia Avenue, Connersville, Indiana

ROOTS-CONNERSVILLE BLOWER
A DIVISION OF DRESSER INDUSTRIES, INC.

Classified Advertising

All classified advertisements are payable in advance. Except for Positions and Help Wanted classifications, this section is reserved exclusively for USED equipment.

RATES: $4.00 for 50 words or less; 70c for each additional 10 words or fraction thereof; $1 per line for bold face headings; $10.50 per inch for line listings.

POSITIONS AND HELP WANTED

MANUFACTURER'S AGENTS WANTED—High quality, British made thermal insulation material ideal for frozen foods, cold stores, refrigeration transportation, etc. Warehoused and distributed in America by New York corporation. Exclusive territories available. Write giving complete particulars and background. Box AU-4, c/o Ice and Regfrigeration.

WANTED IN SO. CALIF. PLANTS

Chief and ass'nt chief staty. engineer. Heavy on refrigeration experience. At least 15 years in operating and super. experience. Must know technical side of refrigeration thoroughly. Neat with records. Ability to handle, teach and get along with men for efficiency. Capable of handling challenges. Detailed reference. Perfect sobriety record. Address Box AU-5, c/o Ice and Refrigeration.

ICE PLANTS—wanted & for sale

FOR SALE—15 ton ice plant. Now operating. To be moved off of premises. $2500.00 cash or what have you to trade. Crystal Ice & Cold Storage, Front & George Sts., De Pere, Wisc.

FOR SALE—Complete 12 ton ice plant located in Gloucester County, Virginia. Frick compressors, electric drive. Will sell the machinery and equipment or the entire plant. Yorktown Ice and Storage Corporation, Yorktown, Virginia.

WANTED—20 to 30 ton complete ice plant. Must be late model and in good condition; also state what railroad facilities are available for moving the complete plant. State lowest cash price. Write C. A. Schultz, 50 Central Park West, New York 23, N. Y.

FOR SALE—14 ton ice plant and storage rooms in fastest growing city in the Southeast. Good winter business; sell twice capacity in summer months; could easily install extra 20 ton tank; 250 ft. on main highway north and south. Easiest truck stop in 300 miles; only one plant in 50 mile radius. Can supply ice all others, selling capacity. Good opening for wholesale fruit. Baum's, 820 Yadkin St., Kingsport, Tenn.

FOR SALE—Former ice cream plant. 4 large cold storage rooms, 113 tons ref., 5 compressors, complete system. 25,000 sq. ft. brick building well located. Will sell with or without building. $7,000 for all the refrigeration. Long easy terms on building; consider lease. Liquidator Best Ice Cream Co., Inc., 636 Jackson Ave., New Orleans 13, La.

FOR SALE
COLD STORAGE — PACKING HOUSE

Fresno Area. Class A construction. Building 120' x 280'. Full concrete basement. First floor brick—16 ft. story heights. First floor has clear span steel trusses, galvanized steel roof, overhead folding doors. First floor truck height with offices across 120' width. Basement has 60 car capacity, 31 degree storage, palletized and serviced with 2 Otis 8000 lb. elevators with 7.5' x 12.5' platforms. Ample property surrounding plant at option. No district congestion. Built in 1947. This fine plant can be obtained at 1947 price level. For further information direct inquiries to Thos. C. Kendall, 213 E. Las Tunas Drive, San Gabriel, Calif.

USED EQUIPMENT-wanted & for sale

FOR SALE

Complete ice making plants, ammonia compressors all sizes, shell & tube condensers, brine coolers, ice cans, valves and fittings.

B & E REFRIGERATING CO.
2 ORANGE ST., NEWARK 2, N. J.
Phone: Mitchell 3-7790 Cable Address "BERECO"

WANTED—Used ice cuber. Would like to buy a used Safety Type "50" F. & E. ice cuber or any similar; good condition; requested at once. Write La Glace Frontenac Ltee., Produite Avec Une Eau, Limpide et Filtree, Quebec, Canada.

FOR SALE—Brand new ice cans below factory price. Size 11x22x48 inside, 16 gauge. Also one 180 h.p. Fairbanks-Morse 3 cylinder style V.A. Diesel engine with direct connected alternator and exciter. Priced low. Versailles Ice Company, Versailles, Missouri.

FOR SALE—COMPLETE ICE MAKING PLANTS

50 ton Frick, 27 can pull, evaporative condensers.
60 ton DeLaVergne, 14 can pull.
35 ton York, Diesel drive, 6 can pull.

AMMONIA COMPRESSORS
1—12½x14½ York, 175 h.p. motor.
2—10x10 Yorks, 100 h.p. motors.
1—9x9 Frick, 50 h.p. motor.
2—8½x8½ Vilters, 75 h.p. motors.
1—9x9 York, 75 h.p. motor.
1—7½x7½ York—One 6x6 York.
Horizontal enclosed type condensers and brine coolers. 20,000 ft. 1¼" ammonia pipe in flanged coils, 5" centers. 1,000 Arctic Pownall ice lifting hooks. Scoring machines, blowers, agitators, etc.

JOHN F. CARSON
2829 N. Broad St. Philadelphia 32, Pa.
BAldwin 9-8549

FOR SALE—National ice making machine. Used very little. Complete and in near new condition. 2,000 lbs. daily capacity. Brunner condensing unit. Powered by G. E. 5 h.p. motor. Can be hauled on a truck. Freezing tank holds 20-100 lb. cans. Write Elroy Koester, Box 134, Stover, Missouri.

FOR SALE—Vertical motor with brine agitator $75.00. Ammonia receiver 30x18' $200.00. Frick compressors, all sizes; York 6x6; Vilter 3½x3½ self-contained. Liquidating a number of ice plants with shell & tube condensers. Write us your requirements. Gordon Equipment Co., 6530 W. Jefferson Ave., Detroit 17, Mich.

FOR SALE

Shephard-Niles Double Transfer Crane
6 ton capacity
4 lifting Hooks
24' 6" Span

2 Bridges, each 24' 6" long—
fully motorized
Operates on 3 60/440 V
Pendant floor control
Built in 1948
Condition, excellent

New Price est. $15,000
Our Price 6,500
This price includes all wiring, rails, switches, etc., with the cranes.

Acme Equipment Co., Inc.
ANdover 3-3430
126 So. Clinton St., Chicago 6, Illinois

USED MACHINERY—continued

FOR SALE
KEHOE MONTHLY SPECIALS

2—7¼x7¼ high-speed Bakers.
2—8x8 high-speed Carbondale Compressors.
1—9x9 high-speed Worthington Compressor.
3—sets of 10x10 duplex York or Frick, with 225 h.p. syn. motor 300 r.p.m.

ROBERT P. KEHOE MACHINERY CO., INC.
278 W. Englewood Ave. West Englewood, N. J.
Phone: TEaneck 7-3916

FOR SALE—York Corp. V.S.A. ammonia compressors; one 6½x6½, one 7½x7½, one 8x8. Also two 7x5 Pennsylvania Pump Co. air compressors. Two 12x10 Union Steam Pump Co. air compressors. All machines with or without motors. Stock of good used ice cans, 300 & 400 lb. sizes. David Gordon, 1502 Indiana Ave., Chicago 5, Ill.

FOR SALE—AMMONIA COMPRESSORS

1—York 8 x 8 — 50 h.p. synchronous.
1—Frick 6 x 6 — 25 h.p. V-belt.
Excellent condition — priced to sell.

DALLAS-FT. WORTH BREWING COMPANY
1026 Young St. Dallas, Texas

FOR SALE—Uline scoring machine, excellent condition, price $650.00. Write Rawlings Ice Company, Burlington RR Yards, Alliance, Nebr.

FOR SALE—One 3x3 self-contained York. 4x4, 5x5, 6x6, 8x8, 9x9 Yorks, splash lubrication. One 10 ton shell & tube condenser. One 3 ton Niagara ammonia blower unit. Ammonia receivers, all sizes. Write E. Niebling, 1546 St. Clair Ave., Mt. Healthy, Cincinnati 31, Ohio.

REFRIGERATION UNIT

275—Ton Ingersoll-Rand barometric steam jet refrigeration unit, fully comp. with centrifugal circulating pumps, motors, and all access. equip. and fittings. New 1943, used 2 yrs., condition like new. Detail specif. and price will be mailed on request.

Philadelphia Transformer Co.
2829 Cedar Street Philadelphia, Pa.

FOR SALE—One 10 h.p., 3 cyl. Universal Freon condensing unit with 10 h.p. motor and starter; less than one year old. McQuay Zero Pak Model X-3 for ammonia, designed for use as combination sharp freezer and blower type locker storage room cooler, suitable for 300 lockers. One 5½"x5½" 2-cyl. Howe ammonia compressor, current model, recently overhauled. 1 ammonia receiver 20"x7'-0"—like new. Arctic Engineering Corporation, 2815 West Montrose Ave., Chicago 18, Ill.

FOR SALE—Baker & Creamery Package 5x5 self-contained units; 2 Frick 6x6 with motors; York 9x9 slow speed, York 9x9 direct connected to Ideal synchronous motor; Frick 9x9 direct connected to Ideal synchronous motor; two open type ammonia condensers; York trunk type freezing coil; 9,500 feet of 1½" coils; 2 h.p. vertical agitator; 400 drop pipes; air blower; 3-can crane; 3-can dip tank; 3-can can dump. 300—11½x22½x44 ice cans. Ford 1½ ton ice delivery truck. Parke Pettegrew & Son Company, 370 West Broad St., Columbus 8, Ohio.

FOR SALE—USED ICE PLANTS & REFRIGERATING EQUIPMENT

Complete Ice Plants 15-75 Ton
Ammonia Compressors, 3" x 3" to 12½" x 14½"
Condensers, Cranes, Blowers, coring Machines, Ice Cans—Various sizes.
Write or wire us on any equipment you may need.

ENTERPRISE EQUIPMENT CORPORATION
77-79 Alexander Street, Yonkers, New York
Cable Add.: ENEQCO Ph.: Yonkers 8-8118-9

VIVIAN SERV-ICE TRADE MARK REG. U.S. PAT. OFF. Products
ICE TOOLS AND SUPPLIES

WE CONTINUE YEAR AFTER YEAR
to make the kind of Ice Picks that will give YOUR customers satisfaction and build up GOOD WILL FOR YOU.

PRICE UPON REQUEST

VIVIAN MANUFACTURING CO. 4132-38 Folsom Ave., St. Louis 10, Mo.

400 TONS CAPACITY

PATENTED DUO-PASS and OILOUT

Aeropass CONDENSER

U. S. Patent Reissue No. 21,917; 22,553

YOU USE LESS POWER...
SAVE CONDENSER WATER...
SAVE UPKEEP COST

For large refrigeration systems, NIAGARA gives you a choice between a battery of condensers (that may be cut on or off with the load) or a high capacity condenser that saves space.

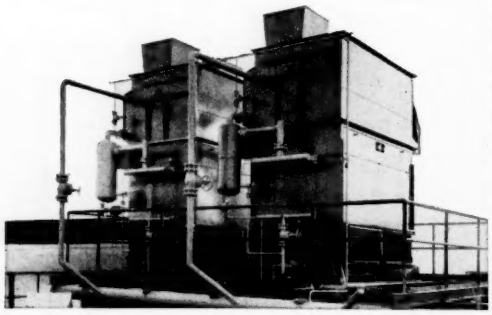
Both have the patented "Duo-Pass" and "Oilout" that remove superheat and keep the system free of oil. Results: you save one-third or more of power cost and upkeep expense. Niagara Patented Balanced Wet Bulb Control gives lowest head pressure operation automatically. ***Write for Bulletin 111.***

NIAGARA BLOWER COMPANY

Over 35 Years Service in Industrial Air Engineering

Dept. **IR,** 405 Lexington Ave. New York 17, N. Y.

Field Engineers in Principal Cities of U. S. and Canada



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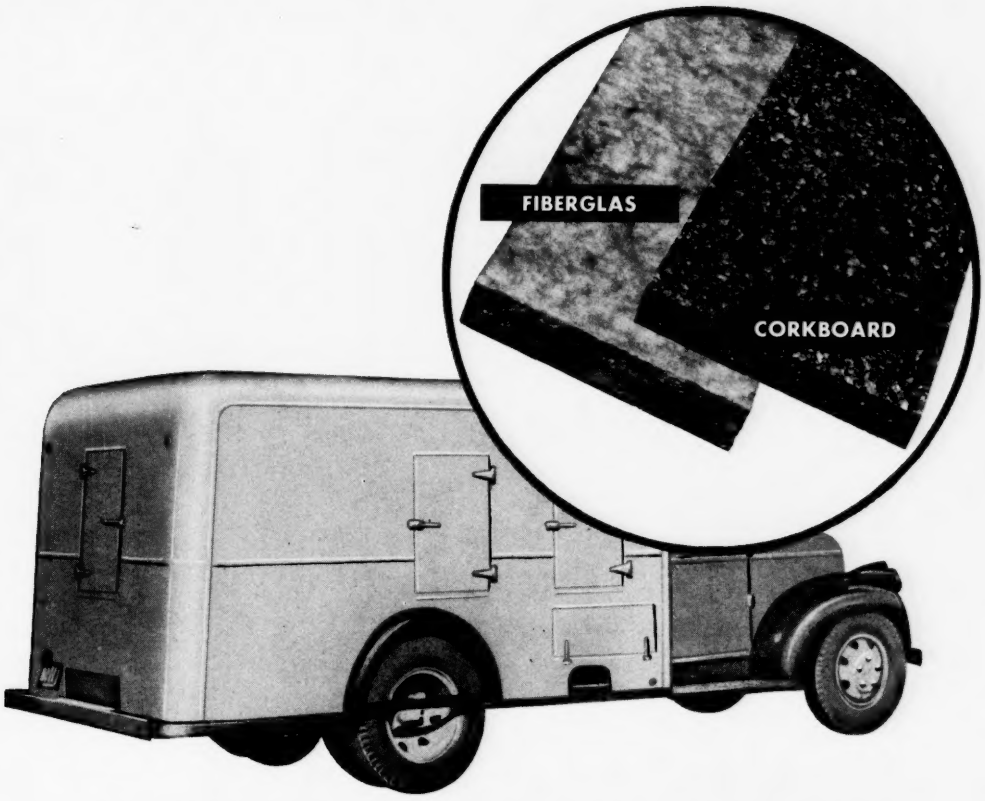


FOR MORE EFFICIENT TRUCK BODY PERFORMANCE

The insulation of refrigerated truck bodies can be greatly simplified by standardizing on just two materials—Fiberglas* and Corkboard.

Fiberglas in semi-rigid batt form has many advantages, particularly for top and sidewall insulation. Insulating efficiency is extremely high, (.245 at 70° mean) permitting minimum thicknesses with more space for payload. The unusually light weight of Fiberglas (2.5 lbs. per cubic foot) holds deadweight down. Fiberglas is non-corrosive in contact with steel or aluminum, even when subjected to alternate wetting and drying. The springy glass fibers will not settle or pack down under vibration, assuring protection for the load throughout the entire life of the body. It is odorless and verminproof.

Fiberglas is available in standard size cartons to keep stocking and handling problems simple. The batts are cut into 24″ x 48″ and 24″ x 96″ sizes in 1″, 1½″, and 2″ thicknesses.

Corkboard is the insulation that's widely used in truck body floors. Its great strength will support the load without the use of heavy, bulky framing members. It will not pack down and its resilience cushions road shocks. In hot weather, corkboard's high efficiency guards the load against heat rising from the road.

These two insulations, Fiberglas and Armstrong's Corkboard, can mean more efficient performance for your refrigerated trucks or trailers. For complete information on these products and their application, call the Armstrong office nearest you or write to Armstrong Cork Company, 4508 Queen Street, Lancaster, Pa.

*®OCFCorp.

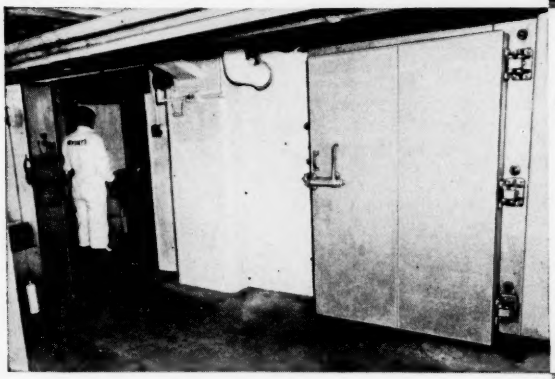
ARMSTRONG'S EQUIPMENT INSULATION

LK CORKBOARD • FIBERGLAS* • TEMLOK

JAMISON doors really hold up under hard usage

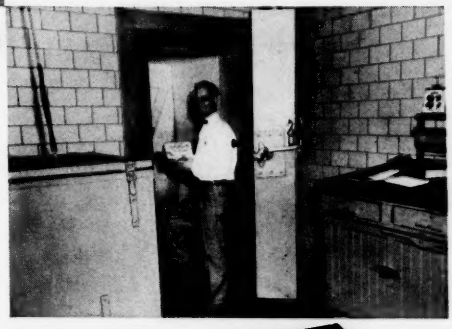
— reports Hershey Creamery Co.

The Hershey Creamery plant in Harrisburg, Pa., produces over 32,500,000 pint packages of ice cream a year—the world's largest producer in this size. Cold storage rooms in the plant get hard daily use. The plant superintendent, H. E. Sauers, in commenting on storage room traffic said: *"We are well pleased with the way the Jamison Doors stand up under the extreme usage they get in our plant."*

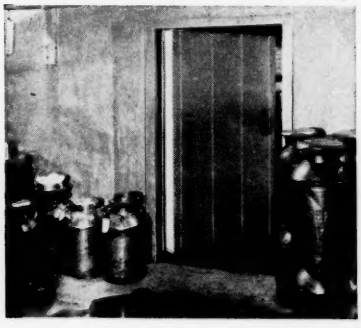


PACKAGE STORAGE ROOM. Jamison Metal Clad Super Freezer Doors maintain a tight seal at all times in these 25° below zero rooms. Positive seal makes refrigeration more efficient by preventing frost from accumulating on refrigeration coils. Thickness of insulation in doors equals that of walls.

PLATFORM BULK STORAGE ROOM. 2½ gallon packages of ice cream are stored in this 30° below zero room. Patented Super Freezer Fastener on metal clad door is most efficient fastener available for doors of this type. H. E. Sauers, Plant Supt., is keeping door in check.



FRUIT STORAGE ROOM. A Jamison Standard Door is used for this room storing fruits and flavors of all types. Temperature of room is held to 40° above zero. Completely metal clad doors insure maximum sanitation and simplify cleaning operations.



Jamison Cold Storage Door Co., Hagerstown, Md., U.S.A.
World's largest builders of cold storage doors—specialists for over 50 years